

MINERALOGICAL ABSTRACTS

(Vol. 4, No. 9, March, 1931.)

Artificial Minerals.

BOWEN (N. L.) & SCHAIRER (J. F.). *The system: leucite-diopside.*

Amer. Journ. Sci., 1929, ser. 5, vol. 18, pp. 301-312, 2 figs.

Pure leucite (KAlSi_2O_6) was prepared by sintering KHCO_3 , Al_2O_3 , and quartz at 1000°C . and then heating at 1700°C .; this being repeated several times with the addition of further potash to supply that lost by volatilization. The product shows lamellar twinning with very low birefringence, n 1.507-1.508. The inversion point is about 603°C . and there is a marked contraction in volume in passing to the low-temperature modification. Pure diopside ($\text{CaMgSi}_2\text{O}_6$) is readily produced by fusing together the constituent oxides. It has α 1.664-6, β 1.671-3, γ 1.694-5, $2V$ 59° , $c:\gamma = 38\frac{1}{2}^\circ$. Fusions of leucite and diopside in various proportions were studied by the quenching method and an equilibrium diagram is given. The eutectic is at 61.5 % diopside and 1300°C . These mixtures are analogous to leucitites, but natural leucitites are much more complex. The petrological aspects of the transformation of leucite and the change to pseudo-leucite (an intergrowth of orthoclase and nepheline) are discussed.

L. J. S.

BOWEN (N. L.) & SCHAIRER (J. F.). *The fusion relations of aegirine.*

Amer. Journ. Sci., 1929, ser. 5, vol. 18, pp. 365-374, 1 fig.

Aegirine (= aegirine) melts incongruently at 990°C . with separation of haematite in a liquid of the composition $\text{Na}_2\text{O} \cdot 0.4\text{SiO}_2$ 71.5 and Fe_2O_3 28.5 %. When a mixture of the composition of aegirine ($\text{NaFeSi}_2\text{O}_6$, having Fe_2O_3 34.5 %) is melted and allowed to cool slowly, haematite is the first to crystallize, then aegirine, at 850°C . some quartz, and finally a residue of sodium disilicate. From quenching experiments with mixtures of $\text{Na}_2\text{O} \cdot 0.4\text{SiO}_2$ and Fe_2O_3 in various proportions an equilibrium diagram is constructed. The petrological bearing of these results is discussed.

L. J. S.

BOWEN (N. L.), SCHAIRER (J. F.), & WILLEMS (H. W. V.). *The ternary system: Na_2SiO_3 - Fe_2O_3 - SiO_2 .* Amer. Journ. Sci., 1930, ser. 5, vol. 20, pp. 405-455, 14 figs.

An equilibrium diagram is obtained by the method of quenching. The ferric oxide decomposes at higher temperatures and only those

parts of the diagram crystallizing below about 1100°C . were studied in detail. Two ternary compounds are formed, aegirine ($\text{Na}_2\text{O}.\text{Fe}_2\text{O}_3.4\text{SiO}_2$), and a new compound $5\text{Na}_2\text{O}.\text{Fe}_2\text{O}_3.8\text{SiO}_2$ as hexagonal crystals. A third ternary compound, $6\text{Na}_2\text{O}.4\text{Fe}_2\text{O}_3.5\text{SiO}_2$, lies outside the triangle, but crystallizes from certain mixtures. Aegirine decomposes on melting, with deposition of haematite; as a result there is great variety in the possible course of crystallization, especially if the solid materials are removed during solidification. The lowest eutectic is fluid below 800°C .; it is rich in silica, and in certain circumstances may be enriched in iron; it deposits quartz directly, even in the absence of 'mineralizers'. The refractive indices of the corresponding glasses have been plotted, and the curves prove to be free from critical variation near any of the compounds or eutectics concerned.

A. F. H.

SCHARIZER (Rudolf). *Beiträge zur Kenntnis der chemischen Zusammensetzung und zur Genese der Eisensulfate XIV*. Zeits. Krist., 1930, vol. 75, pp. 67-87. [Cf. M.A. 3-479.]

Römerite forms only in the presence of free sulphuric acid of a certain concentration. This condition may be given by the hydrolysis of an aqueous solution of rhomboclase [M.A. 1-318] with the formation of the ferric sulphuric acid $\text{H}_4[\text{Fe}(\text{HO})]_2(\text{SO}_4)_4(\text{H}_2\text{O})_6$. The combination of this acid with the base $(\text{HO})[\text{Fe}(\text{H}_2\text{O})_6]$ gives römerite. If the free sulphuric acid is of a lower degree of concentration, then ferrous sulphate and rhomboclase separate; but with the evaporation of the solution these react to give römerite.

Voltaite forms only in the presence of free sulphuric acid of concentration $\text{H}_2\text{SO}_4 + 8\text{aq}$. The voltaite formula of B. Gossner and M. Arm [M.A. 4-272] is criticized. From the molecular ratios given by published analyses, voltaite is regarded as a mixture of (A) $\text{H}_4\text{K}_2\text{Fe}_3[\text{Fe}(\text{HO})]_6(\text{SO}_4)_{12} + 13\text{aq}$, i.e. a potassium ferrous salt of ferri-tetrasulphuric acid $\text{H}_6\text{Fe}_2(\text{SO}_4)_4 + 4.33\text{aq}$; and (B) $\text{K}_6\text{Fe}_{12}\text{Fe}_{10}(\text{SO}_4)_{30} + 45\text{aq}$, i.e. a potassium ferrous salt of the acid $\text{H}_{12}\text{Fe}_4(\text{SO}_4)_{12} + 18\text{aq}$.

L. J. S.

KRAUSS (F.) & SCHRIEVER (W.). *Die Hydrate des Calciumcarbonats*. Zeits. Anorg. Chem., 1930, vol. 188, pp. 259-273, 4 figs.

Calcium carbonate hexahydrate can be prepared pure by gradual addition of N/10-sodium carbonate to N/10-calcium chloride at 0°C . It can be preserved in air at 0°C ., but appears to be only metastable at all temperatures, at least down to 0°C . Dehydration normally

leads to calcite, but if the dehydration is carried out in vacuo under such conditions that no liquid water is formed, the unstable monohydrate is produced. This loses water and passes into calcite in a few hours, or immediately if moistened. The densities were found to be $\text{CaCO}_3 \cdot 6\text{H}_2\text{O}$, d_4^{20} 1.77; $\text{CaCO}_3 \cdot \text{H}_2\text{O}$, d_4^{20} 1.99; CaCO_3 (calcite), d_4^{20} 2.72. No other hydrates could be obtained. The literature on this subject is reviewed. [M.A. 3-164, 481.] M. H. H.

YOSHIMURA (Toyofumi). *On some modifications of calcium carbonate.* Japanese Journ. Geol. Geogr., 1930, vol. 7, Abstracts p. (3) [from Journ. Geol. Soc. Tokyo, 1929, vol. 36, pp. 7-16, Japanese].

Two modifications of calcium carbonate were obtained by the slow interaction of calcium chloride and sodium carbonate. Vaterite, optically uniaxial, positive, ω 1.544-1.546, ϵ 1.636-1.647 (Na). Conchite, α 1.516, γ 1.662, β close to γ , sp. gr. 2.87. μ - CaCO_3 is identical with vaterite. L. J. S.

THIESSEN (P. A.) & KÖPPEN (R.). *Ferrioxhydrohydrate definierter Zusammensetzung.* Zeits. Anorg. Chem., 1930, vol. 189, pp. 113-136, 8 figs.

Hydrated ferric oxide was prepared by exposing ferric ethylate, in absolute alcohol solution, to water vapour. The resulting precipitate was filtered off and dried in the air at 17° C. Isobaric and isothermal dehydration curves of the product indicate the existence of the eight hydrates $2\text{Fe}_2\text{O}_3 \cdot 8, 7, 6, 5, 4, 3, 2$, and $1\text{H}_2\text{O}$, and probably also $2\text{Fe}_2\text{O}_3 \cdot 10$ and $9\text{H}_2\text{O}$. Natural goethite and limonite on dehydration both give rise to $2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$, but the decomposition temperature of goethite is much higher than that of the artificial monohydrate. Limonite is goethite with absorbed water. M. H. H.

CAROBBI (Guido). *Ricerche sul molibdato ferrico idrato. (Ferri-molibdite artificiale.)* Boll. Soc. Nat. Napoli, 1930, vol. 41 (for 1929), pp. 169-179.

Differences in the formula for ferrimolybdate being evidently due to the presence of impurities, the artificially prepared hydrous ferric molybdate is now investigated. The precipitate from dilute solutions of sodium molybdate and ferric chloride is a basic salt $\text{Fe}_2(\text{OH})_2(\text{MoO}_4)_2 \cdot 6\text{H}_2\text{O}$. But in the presence of acetic acid of a certain concentration (p_H 3.5) the normal salt is obtained. After drying over calcium chloride, this has the composition $\text{Fe}_2(\text{MoO}_4)_3 \cdot 8\text{H}_2\text{O}$,

which is regarded as the correct formula for pure ferrimolybdate. At 110° C. $3\text{H}_2\text{O}$ is still held, and dehydration is complete at 250° C. In the presence of less acid the product is a mixture of the basic and normal salts, corresponding with the natural mineral from Bivongi [M.A. 4-139]. L. J. S.

HERSHEY (J. Willard). *Synthetic diamonds*. Trans. Kansas Acad. Sci., 1929, vol. 32, pp. 52-54, 1 fig.

H. Moissan's (1896) experiments were repeated. Sugar-carbon was fused with iron-filings, nickel-steel, manganese-steel, or meteoric iron in graphite crucibles in an electric furnace at about 2500° C., and the mass plunged into cold water. Much flaky graphite resulted, and some diamond, but no description of this is given. An obscure figure magnified 75 diameters measures 93 mm. across. L. J. S.

TOKODY (László). *Mesterséges ezüstkristályok.—Künstliche Silberkristalle*. Ann. Hist.-Nat. Musei Nationalis Hungarici, 1929, vol. 26, pp. 318-320 (Hung.), pp. 320-321 (Germ.), 1 fig.

Silver crystals (1 mm.) grown by electrolysis by V. Wartha in 1897 form mossy aggregates of fine needles with the forms *ad* and predominant *y* (751). V. Z.

Rock-forming Minerals and Petrology.

ZSIVNY (Viktor). *A Fedoroff-féle módszer különös tekintettel a földpátok meghatározására*. (Die Fedoroff'sche Methode mit besonderer Rücksicht auf die Feldspatbestimmung.) Földtani Közlöny, Budapest, 1929, vol. 58 (for 1928), pp. 93-108, 13 figs. (Hung.).

Brief description of the principles and technique of the Fedorov method for the determination of feldspars. V. Z.

BARTH (Tom. F. W.). *Mineralogy of the Adirondack feldspars*. Amer. Min., 1930, vol. 15, pp. 129-143, 4 figs.

ALLING (Harold L.). *Feldspars of the Adirondack anorthosite*. Ibid., pp. 267-271.

Plagioclase and potash-feldspar collected from the anorthosites, &c., at various localities in the Adirondack Mts., New York, were studied under the microscope with the Fedorov universal stage. Four types of perthitic structure are described, and the relation between orthoclase and microcline is discussed. Two stages of crystallization of the feldspars in the anorthosites are distinguished: (1) potash-free

andesine-labradorite free from zoning; (2) potash-free oligoclase together with an almost pure potash-felspar.

The second paper is a criticism of the first, and adds a résumé of the previous literature. The earlier felspar consists of andesine-labradorite with an appreciable though small amount of potash-felspar in solid solution; and the late-stage interstitial felspars are soda-rich anorthoclase and potash-bearing oligoclase. L. J. S.

BARTH (Tom). *Die Symmetrie der Kalifeldspäte*. Centr. Min., Abt. A, 1928, pp. 380-384; Fortschr. Min. Krist. Petr., 1929, vol. 13, pp. 31-35, 2 figs.

Laue photographs of microcline, while showing a monoclinic arrangement of the spots, show that the spots are of different intensities on the two sides of the apparent plane of symmetry. In orthoclase the grouping of the spots is the same, but owing to the minuteness of the twinning the differences in intensity are not evident. Both orthoclase and microcline are believed to be triclinic.

L. J. S.

CHUDOBA (Karl). *Über die Feldspäte der Einschlüsse im Basalt des Dächelsberges und über den „Sanidinanorthoklas“ vom Drachenfels*. Centr. Min., Abt. A, 1930, pp. 145-153, 3 figs.

Phenocrysts of alkali-felspar in trachyte inclusions in the basalt of Dächelsberg and in the well-known trachyte of the Drachenfels, Rhine, contain laths of plagioclase, and have an extinction-angle on (001) of 2° (on (010) 5° ; 2V 48°). For this felspar with the tabular habit of sanidine, but triclinic with oblique extinction on (001), the name sanidine-anorthoclase is suggested.

L. J. S.

CHUDOBA (Karl). *Über umgekehrte Zonenfolge zonargebauter Plagioklase im Melaphyr des Brandberges (SW-Afrika) und über gleichzeitige Antiperthit- und Perthitzonen der Albite des Brandberg-Kerngranits*. Centr. Min., Abt. A, 1930, pp. 273-278, 4 figs.

A phenocryst of plagioclase in melaphyre in the contact-zone of the Brandberg granite, South-West Africa, shows a reversal in the zoning. The core contains 67 % An; the next zone 38 and 48 % An on the two sides of the crystal; the third zone 52 and 57 % An on the two sides; and the outermost zone contains 75 % An. Felspar crystals in the granite show a core of albite surrounded by a zone of antiperthite (albite containing lamellae of orthoclase), then a zone of perthite (albite lamellae in orthoclase), and finally an outer zone of orthoclase.

L. J. S.

REYNOLDS (Doris L.). *Some new occurrences of authigenic potash feldspar.*

Geol. Mag. London, 1929, vol. 66, pp. 390-399, 1 pl., 7 text-figs.

Minute (0.01-0.04 mm.) crystals of feldspar were isolated from Triassic sandstone from Benbradagh Hill, near Dungiven, Co. Londonderry. They have the adularia (*cm*) habit or are lath-shaped in the direction of the *c*-axis. The optical characters suggest anorthoclase rather than microcline, but micro-chemical tests show an excess of potash over soda, and the sp. gr. 2.54 is low. Similar crystals were isolated from the Keuper Marl of Charnwood, Leicestershire; the Dolomitic Conglomerate near Wells, Somersetshire; and from the Magnesian Limestone of Sunderland, Co. Durham. Authigenic feldspars have been previously noted in limestones [Min. Mag. 20-365], but not in sandstones and marls. It is suggested that they have grown from kaolin with the absorption of alkalis. L. J. S.

PARSONS (A. L.). *A chemical and optical study of amphibole.* Univ.

Toronto Studies, Geol. Ser., 1930, no. 29, pp. 29-33.

The following data were determined for hornblendes from 1, Anakie, Victoria; 2, Lochkow, Bohemia; 3, Franklin, N. J.; 4, brilliant black crystals from Monteagle, Hastings, Co. Ontario; 5, Pargas, Finland; 6, Amity, N. Y.; 7, St. Lawrence Co., N. Y.; 8, urallite from Sulzer, Alaska; 9, Pierrepont, N. Y.; 10, Russell, N. Y.; 11, Pakenham, Ontario; 12, Zillertal, Tirol; 13, Gouverneur, N. Y.; 14, Sarahsburg, N. Y. (Anal. 4 by A. R. Graham, the others by M. C. Haller). The results show an increase in the refractive indices with the sum of titanium dioxide and ferric oxide; but no regularity with the calculated proportions of metasilicate and orthosilicate molecules.

	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O
1.	39.50	5.40	14.29	12.02	6.88	0.13	7.96	9.02	2.64	2.12	0.22
2.	39.77	5.10	13.74	6.96	2.34	0.07	15.02	11.74	1.88	2.46	0.44
3.	43.90	1.20	8.27	5.95	9.80	0.34	13.48	10.24	3.26	2.18	0.52
4.	50.36	0.34	4.78	2.99	11.99	0.17	14.82	12.17	1.16	0.66	1.00
5.	41.90	0.46	14.90	1.90	3.50	0.06	18.54	13.11	2.33	1.46	0.35
6.	46.40	0.90	9.73	0.92	1.72	0.08	21.96	12.72	2.44	1.00	0.45
7.	54.32	0.15	2.05	2.18	4.24	0.13	21.16	12.10	1.16	0.62	0.38
8.	54.84	trace	3.02	2.22	11.22	0.30	15.28	11.52	0.32	0.19	1.02
9.	56.04	0.15	1.23	1.40	4.10	0.18	22.20	11.56	0.79	0.48	0.67
10.	55.10	0.12	2.22	1.34	3.66	0.15	22.04	11.32	0.94	0.78	0.59
11.	56.60	0.07	1.41	1.04	4.28	0.20	22.26	12.50	0.58	0.27	0.82
12.	56.00	trace	2.01	1.34	4.27	0.15	22.12	11.84	1.44	0.36	0.63
13.	57.30	0.09	1.42	0.96	0.28	0.05	25.20	12.84	0.78	0.66	0.68
14.	56.10	0.10	1.30	0.48	1.01	0.14	24.94	13.06	0.84	0.90	—

	F.	P ₂ O ₅ .	Total less O for F.	Sp.gr.	α .	β .	γ .	mm.	Extn. angle.
1.	—	0.16	100.29	3.337	1.700	<1.739	>1.739	55° 34'	13°
2.	—	0.11	99.79	3.221	1.676	1.700	1.718	—	13
3.	2.06	trace	100.34	3.256	1.644	1.657	1.663	55 50	18½
4.	—	—	100.44	3.171	1.631	1.645	1.647	—	18
5.	3.06	0.02	100.30	3.163	1.622	1.632	1.641	55 51	18–19°
6.	3.09	trace	100.11	3.090	1.622	1.631	1.638	54 22	22–22°
7.	2.49	0.18	100.11	3.064	1.618	1.628	1.637	55 19	19
8.	—	trace	99.93	3.131	1.628	1.642	1.653	—	15
9.	0.16	trace	99.89	3.051	1.611	1.626	1.639	55 27	17
10.	1.32	0.04	100.07	3.056	1.613	1.621	1.634	55 39	17
11.	—	0.02	100.00	3.044	1.616	1.626	1.634	—	18
12.	—	—	100.16	3.042	1.613	1.626	1.636	55 38	16
13.	0.28	—	100.42	2.998	1.609	1.623	1.636	55 42	16
14.	0.83	trace	99.93	3.024	1.609	1.622	1.636	55 51	17–18°

2, also CO₂ 0.16.

L. J. S.

BARNES (Virgil E.). *Changes in hornblende at about 800° C.* Amer. Min., 1930, vol. 15, pp. 393–417, 6 figs.

Detailed optical determinations were made for twenty hornblendes (including actinolite and tremolite) from various localities, both before and after the material was heated in air at about 850° C., and in some cases also after reheating in hydrogen. A selection of the data for the two analysed specimens is quoted below. Hornblende from Lanark Co., Ontario; I before, and II after heating in air, and II α after reheating in hydrogen (analyst, R. B. Ellestad). Hornblende from Renfrew Co., Ontario; III before, and IV after heating (analyst, L. C. Hurd).

	SiO ₂ .	TiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MnO.	MgO.	CaO.	Na ₂ O.	K ₂ O.
I.	43.59	0.86	11.17	4.60	7.48	0.29	14.59	11.60	2.49	1.95
II.	—	—	—	12.42	0.39	—	—	—	—	—
III.	41.02	1.02	9.69	9.23	16.51	trace	7.20	10.65	2.72	1.33
IV.	—	—	—	23.40	4.12	—	—	—	—	—

	H ₂ O.	F.	Total.	Sp. gr.	α_D .	β_D .	γ_D .	2V.	$\gamma:c$.
I.	0.74	0.29	99.53	3.175	1.6511	1.6589	1.6665	88°	23°
II.	0.05	0.34	—	3.215	1.6626	1.6961	1.7100	66	5
II α .	—	—	—	—	1.6493	1.6583	1.6670	88	24
III.	0.92	0.40	100.50	3.258	1.6804	1.6980	1.7000	38	20
IV.	0.08	0.30	—	3.320	1.7020	1.7690	1.7960	65	0

The change in colour from green to brown when hornblende is heated is accompanied by an increase in the density, refractive indices, birefringence, and dispersion of the refractive indices, a decrease in the extinction-angle, and a change of the optic axial angle to about

65°. These changes are definitely related with the alteration of ferrous oxide to ferric oxide. [Cf. M.A. 3-294, 495; 4-200, 287.]

L. J. S.

PHILIPSBORN (H. v.). *Zur chemisch-analytischen Erfassung der isomorphen Variation gesteinsbildender Minerale. Die Mineralkomponenten des Pyroxengranulits von Hartmannsdorf (Sa.).* Chemie der Erde, 1930, vol. 5, pp. 233-253.

The powdered rock (pyroxene-granulite from Hartmannsdorf, Saxony) was separated into different fractions with Clerici's solution and an electromagnet. Analysis Ia is of the heavier and darker fraction (d 3.55-3.58, n [$= \frac{1}{2}(\alpha + \gamma)$] 1.715) of the hypersthene, and Ib of the lighter and paler fraction (d 3.49-3.55, n 1.706). IIa of the heavier fraction (d 3.40-3.42, n 1.708) and IIb the lighter fraction (d 3.37-3.40, n 1.698) of the monoclinic pyroxene. III of the heavier fraction (d 2.69-2.71, n 1.555-1.560) of the plagioclase, corresponding with $Ab_{47}An_{53}$; the lightest fraction with n 1.547 corresponds with $Ab_{70}An_{30}$. IV of the garnet (d 3.92, n_{Li} 1.762, n_{Na} 1.766, n_{Ti} 1.771), corresponding with almandine 41.9, pyrope 33.5, grossular 19.0, andradite 4.0, spessartine 1.6. V, ilmenite. From optical data on the still lighter and heavier fractions of the pyroxenes their composition is arrived at by extrapolation. VI is the bulk composition of the rock (d 3.181), corresponding with hypersthene 28.53, monoclinic pyroxene 29.60, plagioclase 32.59, orthoclase 0.44, garnet 3.31, ilmenite 4.35, magnetite 0.35, apatite 0.83 %.

	SiO ₂ .	TiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MnO.	MgO.	CaO.	Na ₂ O.	K ₂ O.	Total.
Ia.	49.42	0.54	2.64	3.42	23.15	0.26	18.17	0.94	1.23	0.19	99.96
Ib.	50.30	0.53	3.26	3.26	20.09	0.26	20.14	1.41	1.28	0.22	100.75
IIa.	49.50	0.69	4.39	2.81	9.90	0.24	11.87	19.34	1.47	0.16	100.37
IIb.	50.12	0.65	4.74	2.01	8.57	0.24	12.87	19.84	1.60	0.14	100.78
III.	55.41	—	29.42	0.40	—	—	—	11.11	n.d.	n.d.	96.34
IV.	38.50	0.88	21.77	1.47	19.64	0.72	8.75	8.50	—	—	100.23
V.	—	48.3	—	10.3	38.3	0.3	1.7	—	—	—	100.4
VI.	48.61	2.45	12.33	3.22	9.64	0.17	10.12	10.37	2.92	0.18	100.47

V, also insoluble silicates 1.5; VI, also P₂O₅ 0.36, Cr₂O₃ 0.10 %.

L. J. S.

JONES (W. A.). *The petrography of the rocks in the vicinity of Killarney, Ontario.* Univ. Toronto Studies, Geol. Ser., 1930, no. 29, pp. 39-60, 1 pl., 5 text-figs.

Four geological maps of this district, on the north shore of Georgian Bay, Lake Huron, show the different interpretations.

A coarse-grained granite-gneiss shows a sharp contact against a fine-grained granite-gneiss; and fifteen chemical analyses of the rocks taken at various places across and along the strike show little variation. The fine-grained rock is of slightly later age. Analyses of the quartzite bordering the fine-grained granite-gneiss show no gradation between these two rocks.

L. J. S.

JONES (W. A.). *A study of certain xenoliths occurring in gabbro at Sudbury, Ontario*. Univ. Toronto Studies, Geol. Ser., 1930, no. 29, pp. 61-73, 3 pls., 3 text-figs.

Scattered through the gabbro are xenoliths, up to 100 feet long, of a white plagioclase-rock, which at the margins contains large (to $10\frac{1}{2}$ inches) crystals of green hornblende and towards the centre veins and patches of quartz. The hornblende from the marginal zone gave analysis I, and has α 1.618, β 1.631, γ 1.642, $2V$ near 90° , $\beta = b$, $\gamma : c = 16^\circ$. The matrix of the hornblende crystals gave anal. II, corresponding with bytownite $Ab_{20}Or_5An_{75}$. The plagioclase from near the centre of a xenolith gave III, corresponding with andesine $Ab_{62}Or_8An_{30}$.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MgO.	CaO.	Na ₂ O.	K ₂ O.	H ₂ O.	Total.	Sp. gr.
I.	51.88	7.36	2.13	5.68	16.36	13.70	0.44	0.60	0.96	99.87	3.147
II.	48.50	31.26	0.55	0.49	0.09	14.76	2.34	0.87	0.58	99.64	2.737
III.	63.02	24.14	—	—	—	5.52	6.72	1.18	—	100.58	2.658

I, including TiO₂ 0.41, MnO 0.25, CO₂ 0.10, P₂O₅ trace. II, including CO₂ 0.20. Analyses by M. C. Haller.

Analyses are also given of the gabbro and of the adjacent quartzite. The xenoliths represent blocks of quartzite into which there has been a transfusion of material from the gabbro magma. Similar xenoliths of quartzite in diabase, but showing less alteration, are mentioned from Blind River, Ontario.

L. J. S.

FRASER (H. J.). *Paragenesis of the Newry pegmatite, Maine*. Amer. Min., 1930, vol. 15, pp. 349-364, 3 figs.

Three periods in the formation of the pegmatite are distinguished on the same lines as described by K. K. Landes [M.A. 3-203], but they are all really part of one continuous process. During the first period the solutions deposited mainly silicates; pyrite, black tourmaline, yellowish lepidolite, microcline, quartz. The second period began with the deposition of silicates and then changed to

lithium silicates and phosphates; tourmaline, beryl, apatite, micro-lite, cassiterite, columbite, mauve lepidolite, muscovite, cleveandite, quartz, spodumene (some crystals over 10 feet long), pollucite, amblygonite and montebrasite, triphylite, blende, uraninite. The third period was one of deposition of phosphates; albite, beryl, gem tourmaline, beryllonite, cookeite, chalybite, rose-quartz (as small well-formed crystals), eosphorite, francolite, herderite, reddingite. Finally, supergene processes; manganese oxides, limonite, heterosite, chalcedony, opal. Brief descriptions are given of each of these minerals.

L. J. S.

SPENCE (Hugh S.). *Pegmatite minerals of Ontario and Quebec*. Amer. Min., 1930, vol. 15, pp. 430-450, 474-496, 4 figs.

Records are collected from the literature, and many new observations added, on the occurrence of minerals in Canadian pegmatites. Normal granite-pegmatites are of wide distribution in Ontario and Quebec and have been quarried at many places for feldspar and sometimes quartz. The feldspar is mainly microcline-perthite, sometimes as crystals up to 30 feet in length. Notes are given of 48 species of minerals from these granite-pegmatites. In the syenite-pegmatites, associated with nepheline-syenite in the Haliburton and Bancroft districts, Ontario, the predominating feldspar is albite, and 25 minerals are here noted. As an appendix, mineral lists are given for (1) the tin-bearing pegmatites of New Ross, Nova Scotia, [M.A. 2-400, 237]; (2) the phlogopite- and apatite-bearing pyroxenite-pegmatites of Ontario and Quebec; (3) the tin- and lithium-bearing pegmatites of Manitoba; (4) the muscovite-bearing granite-pegmatites of British Columbia.

L. J. S.

CHUDOKA (Karl). „*Brandbergit*“, ein neues aplitisches Gestein aus dem Brandberg (SW-Afrika). Centr. Min., Abt. A., 1930, pp. 389-395, 1 fig.

The central granite of the Brandberg, South-West Africa, is cut by numerous dikes (30-50 cm. wide) of an aplitic rock, called brandbergite, consisting of orthoclase, quartz, and biotite, with little arfvedsonite and albite, and accessory zircon and magnetite. Quartz and feldspar form a granophyric intergrowth enclosing earlier grains of the same minerals. In chemical composition the rock (anal. I) shows a relation to the paisanites and belongs to the soda series,

whilst the granite (anal. II) belongs to the potash series according to the Niggli values.

	SiO ₂ .	TiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MnO.	MgO.	CaO.	Na ₂ O.	K ₂ O.	H ₂ O.
I.	75.15	0.16	11.30	1.19	2.58	0.16	0.09	0.15	3.53	4.81	0.42
II.	69.75	0.66	13.16	0.47	4.40	0.15	0.47	1.94	4.30	4.13	0.59

II, also P₂O₅ 0.10. Totals: I, 99.54; II, 100.12.

L. J. S.

MOROZEWICZ (J.). *Mariupolit i jego krewniaki*.—*La mariupolite et ses parents*. Prace Polsk. Inst. Geol. (Trav. Serv. Géol. Pologne), 1929, vol. 2, pt. 3, pp. 217–350, 11 pls. [Polish with French résumé pp. 301–349.]

— *Der Mariupolit und seine Blutsverwandten*. (*Chemisch-petrographisches Studium*.) Tscherma's Min. Petr. Mitt., 1930, vol. 40, pp. 335–436, 17 pls. [Translation of the Polish text with reproductions of 35 of the 45 plate figures.]

Mariupolite (of J. Morozewicz, 1902) from Mariupol, Ukraine, is an extreme member of the nepheline-syenite series; it consists of albite, nepheline, and aegirine, with sometimes lepidomelane, sodalite, or cancrinite, and accessory magnetite, beckelite, and pyrochlore. The order of intrusion of this and the associated rocks was that of increasing basicity:

	Mean sp. gr.	Mean SiO ₂ (mol. %).
1. Upper biotite-granite	2.632	80.0
2. Diabase- and amphibole-granite ...	2.678	74.4
3. Alkali-syenites	2.699	70.5
4. Mariupolites	2.712	63.9
5. Foyaites	2.718	60.6
6. Wehrlite	3.359	46.2

Many chemical analyses (some of them previously published, M.A. 3–109, 4–202) are given of these rocks and of their constituent minerals, and the relations are discussed in detail. L. J. S.

ESKOLA (Pentti) & SAHLSTEIN (Th. G.). *On astrophyllite-bearing nepheline syenite gneiss found as a boulder in Kihtelysvaara, eastern Finland*. Compt. Rend. Soc. Géol. Finlande, 1930, no. 3, pp. 1–12, 3 figs.

This rock, which is exceptionally rich in alkalis, shows large phenocrysts of amphibole (14 %) in a fine-grained groundmass of nepheline (34 %), albite (28 %), orthoclase (17 %), with astrophyllite (2.3 %), sphene (1 %), a catapleiite-like mineral, cancrinite, aegirine, and apatite. Analysis I of the rock (sp. gr. 2.78), and II of the

amphibole (sp. gr. 3.230–3.456), by L. Lokka. The amphibole is of an unusual mixed type. It has the optic axial plane \perp (010), $\gamma = b$, $\alpha : c = 20\text{--}25^\circ$, 2V small, negative, α 1.670, β 1.680 about, γ 1.682; pleochroism, α dark-green, β pale-brown, γ black. The astrophyllite, as orange-yellow micaceous flakes, has α 1.676 (calc.), β 1.700, γ 1.731, 2V about 84° .

	SiO ₂ .	TiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MnO.	MgO.	CaO.	Na ₂ O.	K ₂ O.	H ₂ O.	Total.
I.	55.31	1.18	19.56	1.92	3.17	0.28	0.76	1.53	10.32	4.67	0.64	100.09
II.	49.12	2.07	4.56	7.68	16.70	0.51	5.63	2.84	8.24	1.81	1.10	100.26

I, also ZrO₂ 0.31, BaO 0.06, P₂O₅ 0.19, F 0.33.

L. J. S.

ESKOLA (Pentti) & SAHLSTEIN (Th. G.). *Ueber die unvollkommene Auslöschung einiger Amphibole*. Compt. Rend. Soc. Géol. Finlande, 1930, no. 3, pp. 13–19.

The amphibole of the rock described in the preceding paper is peculiar in not giving complete extinction between crossed nicols on (010), even in monochromatic light. The extinction is more complete for violet than for red light. After the crystals have been heated at 800–900° C. the extinction is normal. The reason for this phenomenon, which is also shown by some other alkali-amphiboles, is discussed. Optical explanations are rejected, and it is probably due to a lack of homogeneity of the crystals, a fine perthitic intergrowth of two amphiboles being suggested.

L. J. S.

ZSIVNY (Viktor). *Kenyérkérgű andezitbomba Tusnádfürdőnél.—Andesitische Brodkrustenbombe von Tusnádfürdő*. Mat. Természett. Értesítő, Magyar Tudom. Akad. Budapest, 1929, vol. 46, pp. 277–290 (Hung.), pp. 291–293 (Germ.), 6 figs.

Description with chemical analysis of a bread-crust bomb of hornblende-andesite from Tusnádfürdő, Hargita Mts., Transylvania, with determinations of the feldspars by the Fedorov method. The green hornblende has $\gamma : c = +15^\circ$, 2V 77° , negative, $\gamma - \alpha$ 0.0235. A colourless diopside or diopsidic augite, forming the nucleus of a green hornblende twin, has $\gamma : c = +40\frac{1}{2}^\circ$, $\gamma - \alpha$ 0.0278. V. Z.

DENAEYER (M. E.). *Sur l'andésite à pigeonite à faciès diabasique de Taodeni (Sahara soudanais) et sur l'origine de la bowlingite qu'on y rencontre*. Bull. Soc. Franç. Min., 1924, vol. 47, pp. 355–357.

The typical constituents of andesites from this locality are basic plagioclase and ophitic pigeonite, the interstices being filled with a greenish-brown glass. In specimens from Taodeni bowlingite occurs

either at the centre of pigeonite crystals or as elongated prisms. Neither olivine nor hypersthene makes its appearance in these rocks; it is probable, therefore, that the bowlingite is an alteration product of pigeonite.

F. A. B.

DENAEYER (M. E.). *Nouvelles observations sur la géologie du Tibesti-Djado-Kaouar*. Compt. Rend. Acad. Sci. Paris, 1924, vol. 179, pp. 472-475.

Records observations and describes a rock collection made by Captain Rottier. The volcanic rocks from eastern Tibesti include riebeckite-rhyolite, rhyolitic obsidian (sp. gr. 2.458, n 1.494), and andesitic basalts saturated as regards silica. Thenardite occurs in a natron-hole in the caldera of Tidichi and in the oasis of Seggueddin.

W. C. S.

BOURCART (Jacques) & DENAEYER (M. E.). *Sur les caractères lithologiques des laves de l'Ahaggar, Sahara central (Mission Jacques Bourcart, 1922-1923)*. Compt. Rend. Acad. Sci. Paris, 1925, vol. 181, pp. 1073-1075.

Three series of eruptive rocks are recognized; Tertiary (?), Ilamân (or phonolitic) series; Pliocene (?) basaltic eruptions (basalts of the plateaux); and recent eruptions (basalts of the valleys). The last series includes true basalts, basalts- β or 'basanitoides', and limburgites. The earlier basalts all carry phenocrysts of olivine and augite, and form a continuous series from 'basanitoides' to basalts saturated with silica. The phonolitic series includes phonolites of three kinds, one with nepheline and sodalite, others with sodalite only, and others with h  y  ne as the feldspathoid. The dark minerals are aegirine-augite, aegirine, and aenigmatite (cossyrite). Associated with the phonolites are alkali-trachytes with barkevicite, a quartziferous andesite with olivine, and a biotite-dacite. Dike-rocks intrusive in the phonolitic series are described as aegirine-bearing trachytes (one with interstitial quartz), a s  lvsbergite, normal trachytes, and an andesite.

W. C. S.

DENAEYER (M. E.). *Essai de coordination des donn  es lithologiques de quelques r  gions Sahariennes et Soudanaises*. M  m. Soc. G  ol. Belg., 1925, vol. 5 (= Livre Jubilaire vol. 2), pp. 90-99.

A summary in tabular form of the records of eruptive rocks from Taodeni in the west to Jebel Mara in the east, and from Ahaggar to Lake Chad. The general character of the eruptive and volcanic

rocks is discussed. The author considers that the general tendency of the eruptive magma is towards impoverishment in silica with time. A list of references to work by previous authors is given.

W. C. S.

DENAEYER (M. E.). *Les caractères lithologiques des roches éruptives du Sahara soudanais et de l'Afrique équatoriale.* Compt. Rend. Congrès Soc. Sav. Sci. Paris, 1926 (for 1925), pp. 394-401, 1 fig.

A brief summary of records of rocks described from this area and a discussion of the known distribution of alkali-rocks and of the magnesian group of rocks in Africa, illustrated by a small map. A bibliography contains some useful references to little-known papers.

W. C. S.

SMYTHE (J. A.). *A chemical study of the Whin Sill.* Trans. Nat. Hist. Soc. Northumberland, Durham, and Newcastle-upon-Tyne, 1930, n. ser., vol. 7, pp. 16-150, 1 pl. (map), 6 text-figs. [Cf. Min. Mag., **21**-493, **22**-100.]

From a collection of 2950 chips of the normal rock an average sample of the whole and 38 samples in geographical groups were prepared. Analysis of the main sample, representing the average composition of the Whin Sill [cf. Min. Mag. **21**-530], gave SiO_2 50.32, TiO_2 2.48, Al_2O_3 15.41, Fe_2O_3 3.09, FeO 8.92, MnO 0.18, MgO 4.89, CaO 8.86, BaO 0.03, Na_2O 2.03, K_2O 1.06, $\text{H}_2\text{O} +$ 1.30, $\text{H}_2\text{O} -$ 0.75, CO_2 0.46, P_2O_5 0.22, S 0.15, total (less O for S) 100.10, also PbO 0.0024, NiO 0.01, Cr_2O_3 0.008, V_2O_3 0.06, Cl, Cu, Zn traces; sp. gr. 2.934. Analyses are also given of several of the group-samples and of specimens of the exceptional types. Numerous determinations of specific gravity are given, ranging for the normal rock from 2.871 to 2.976; and in the exceptional varieties from 2.615 for the felsitic micropegmatite to 3.019 for the coarse rock from the Crook boring. These variations in specific gravity are discussed in detail in relation to the chemical composition (especially alkalis, FeO , H_2O and CO_2) and the mineral composition. The intrusion and differentiation of the magma, relation to dikes, and the various alteration processes are discussed in detail.

L. J. S.

BARTH (Tom. F. W.). *Pacificite, an anemousite basalt.* Journ. Washington Acad. Sci., 1930, vol. 20, pp. 60-68, 1 fig.

Certain feldspathic basalts associated with nepheline-basanite and phonolitic trachyte amongst the undersaturated lavas of the Pacific

islands show nepheline in their 'norm' though this is not actually present in the rock. To account for this the presence of the carnegieite molecule (anorthic, $\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8$) is assumed in an anemousite feldspar, and the rock is called anemousite-basalt or pacificite. The 'nepheline-andesine-basalt' from Maui, Hawaii, described by H. S. Washington [M.A. 4-132] is calculated to contain anemousite 48, labradorite phenocrysts 10, pyroxene 25, olivine 2, iron-ores 13, apatite 1 %, and this rock is called pacificite. Washington's 'chrysophyric basalt' from Mauna Kea [M.A. 4-132] contains anemousite 34, plagioclase 7, pyroxene 33, olivine 18, iron-ores 7, apatite 1 %, and is called olivine-pacificite. Some of the anemousite has β 1.550, 2V 60°, positive, or β 1.545, 2V 84°, but in grains with β < 1.540 the optic axial angle ranges from 10° to 65°. The rocks are too fine-grained for the feldspar to be isolated for chemical analysis.

L. J. S.

BRAUNS (R.). *Die chemische Zusammensetzung der Basaltlaven des Laacher Seegebietes*. Neues Jahrb. Min., Abt. A, 1928, Beil.-Bd. 56, pp. 468-498.

Brief descriptions with chemical analyses, some of which are new, of leucite-nepheline-tephrite (Niedermendig and Ettringer-Bellerberg); leucite-nepheline-basanite (Bausenberg); leucite-basanite (Veitskopf, north of Thür, and 'bomb' in trachyte-sands of Laacher See); leucite-basalt (Fornicher Kopf, Lorenzfelsen, Sulzbusch, and 'bomb' in trachyte-sands of Laacher See); leucite-bearing nepheline-basalt (Ohlig's quarry, $\frac{1}{2}$ km. south of Plaidt in the Wannen group); leucite-nepheline-basalt (Rodderberg); hauyne-rich leucitite (Hochsimmer); melilite-nephelinite (Herchenberg and Hannebacher Ley); and loess 'bombs' in the lava of Rodderberg near Mehlem. The new analyses are by Adele Brauns and Erna Frerichs. The abundant references to previous literature on these rather well-known rocks are very helpful.

W. C. S.

BISSET (Charles B.). *Geological notes on North-East Land [Spitzbergen] and Franz Josef Land*. British Arctic Expedition of 1925. Trans. Edinburgh Geol. Soc., 1930, vol. 12, pp. 196-206.

Basaltic rocks from Cape Barents in Franz Josef Land are described and are identified as tholeiites. They are similar to the basalts from Cape Flora and Hooker Island described by J. J. H. Teall (1898). Alteration products occurring as pseudomorphs after olivine and in

the mesostasis, regarded by Teall as palagonite, are identified with chlorophaeite [Min. Mag. 20-438]. W. C. S.

DAY (T. Cuthbert). *An igneous dyke in the quartz-banakite of Bangly quarry near Haddington.* Trans. Edinburgh Geol. Soc., 1930, vol. 12, pp. 256-259, 2 pls.

Sanidine crystals, often two inches long, previously recorded in a quartz-banakite in Bangly (Silver Hill) quarry, are found to occur as xenocrysts in a dike of 'trachybasalt' intrusive in the quartz-banakite. An intrusion-breccia in the same quarry is also described. Analyses are given of the quartz-banakite and of the dike, one an average sample, the other avoiding the sanidine xenocrysts as much as possible. W. C. S.

PORTEVIN (Albert). *Le basalte fondu.* Mém. Soc. Ingénieurs Civils de France, 1928, pp. 266-300, 2 pls., 9 text-figs.

Basalt when melted and cast in moulds and subsequently devitrified by reheating at a carefully controlled temperature yields a material which is especially resistant to mechanical strain and is an excellent electric insulator. A manufacturing process has been elaborated and the products are used in the electrical and chemical industries and as a paving material. The author describes the principles of the process and discusses the conditions necessary for devitrification. By careful choice of the temperature, devitrification is made to produce 'spherocrystals', giving a very fine texture and great resistance to mechanical strain. In the process of melting, partly melted olivine crystals sink to the bottom of the crucible, and when cooling begins, long acicular crystals of olivine separate out in this basal portion. Photomicrographs illustrate these concentrations of olivine and also contrast the texture produced on devitrification by slow cooling and by reheating. W. C. S.

CHUDOBA (Karl). *Über seltenere Mineraleinschlüsse in Effusivgesteinen.* Centr. Min., Abt. A, 1930, pp. 342-349, 3 figs.

Inclusions of blende in basalt from Hühnerberg near Ittenbach and of molybdenite in basalt from Ölberg, Siebengebirge, Rhine. Phillipsite in an inclusion of schistose nepheline-syenite in phonolite from Oberschaffhausen, Kaiserstuhl, Baden. A core of untwinned phillipsite is surrounded by a zone of calcite, which in turn is surrounded by twinned phillipsite. L. J. S.

SZENTPÉTERY (Zs.) & EMSZT (K.). *Petrochémiai adatok Szarvaskő vidékéről.*—SZENTPÉTERY (S. v.) & EMSZT (K.). *Petrochemische Daten aus der Gegend von Szarvaskő.* Földtani Közlöny, Budapest, 1929, vol. 58 (for 1928), pp. 109–114 (Hung.), 216–222 (Germ.), 1 pl.

Descriptions with chemical analyses of the differentiation products of a gabbroidal magma, viz. diorite-pegmatite, diorite-aplite, quartz-diorite-porphyrite, gabbro-diorite, gabbro-diorite-aplite, hypersthene-diallage-gabbro, hornblende-gabbro, gabbro-pegmatite, gabbro-diabase, spilite-porphyrite, and diabase. V. Z.

BEDER (Roberto). *Sobre la existencia de platino nativo en una serpentina de Alta Gracia (prov. de Córdoba).* Revista Minera, Soc. Argentina de Minería y Geol., 1930, vol 2, pp. 97–101.

Serpentine quarried at this locality in Argentina for an ornamental stone ('black marble') contains phenocrysts of enstatite and residual olivine and tremolite. Pannings of the crushed rock yielded magnetite, chromite, and a few grains of platinum. L. J. S.

WALKER (T. L.). *Dalmatianite, the spotted greenstone from the Amulet mine, Noranda, Quebec.* Univ. Toronto Studies, Geol. Ser., 1930, no. 29, pp. 9–12, 1 pl.

Dalmatianite¹ from the new mining area in Timiskaming Co., western Quebec, is a pre-Cambrian volcanic rock, which on weathered surfaces shows light spots ($\frac{3}{4}$ inch across) on a dark ground; but on a fresh surface the spots are darker than the groundmass. Chemical analyses of these rocks show a range in silica from 30 to 68 % with little or no lime (e.g. SiO₂ 30.00, Al₂O₃ 21.41, Fe₂O₃ 7.06, FeO 21.22, MgO 11.54, H₂O 6.84, &c., sp. gr. 3.04). In the acid type the spots consist of a mosaic of quartz grains, and the groundmass largely of biotite with specks of magnetite and metallic sulphides. In the basic type the spots consist mainly of cordierite with some actinolite and magnetite, and the groundmass of biotite. The cordierite has α 1.540, β 1.547, γ 1.550, 2V large, negative, and gave on analysis by M. C. Haller SiO₂ 44.46, TiO₂ 0.64, Al₂O₃ 25.76, Fe₂O₃ 8.40, FeO 8.24, MnO 0.47, MgO 7.42, CaO 0.62, Na₂O 0.74, K₂O 0.68, H₂O

¹ Name used by the local miners, from a resemblance to the spotted Dalmatian dog, and given by H. C. Cooke in his description of the rock (Summary Report, Geol. Survey, Canada, 1927, for 1925, part C, p. 41 c and plate). Another spotted rock has been called 'leopardite' (C. L. Hunter, 1853).

2.73 = 100.16. The spots in these rocks perhaps represent amygdaloidal fillings. L. J. S.

TILLEY (Cecil E.) & FLETT (Sir John S.). *Hornfelses from Kenidjack, Cornwall*. Summ. Progr. Geol. Survey Great Britain, 1930, for 1929, pt. 2, pp. 24-41, 2 pls., 4 text-figs.

Anthophyllite-cordierite-hornfels and other types containing cummingtonite, plagioclase, spinel, and diaspore are described from near the contact of the Land's End granite mass. Chemical analyses show these rocks to be very rich in magnesia and iron, and they are believed to represent weathered greenstones (dolerite). Cordierite appears as large patches and anthophyllite as stellate groups. Analysis of the cummingtonite gave: SiO_2 53.12, TiO_2 0.21, Al_2O_3 2.78, Fe_2O_3 0.25, FeO 22.46, MnO 0.27, MgO 15.46, CaO 2.26, H_2O 3.33 = 100.14; α 1.643, γ 1.670, $\gamma:c = 19^\circ$. Hornfelsed slates at the same locality contain andalusite, cordierite, biotite, and corundum.

L. J. S.

SUGI (Ken-ichi). *On the injection-fels of the Tsukuba district*. Japanese Journ. Geol. Geogr., 1930, vol. 7, Abstracts p. (4) [from Journ. Geol. Soc. Tokyo, 1928, vol. 35, pp. 640-653, Japanese].

— *On the granitic rocks of Tsukuba district and their associated injection-rocks*. Japanese Journ. Geol. Geogr., 1930, vol. 8, pp. 29-114, 3 pls., 22 text-figs. (English).

The biotite-granite mass near Tsukuba, prov. Hitachi, Japan, is bordered by a series of 'injection rocks' which pass outwards into hornfelses and finally into spotted biotite-slate. The 'injection rocks', containing biotite, fibrolite, cordierite, and andalusite altered to pinite, are believed to represent an impregnation or 'lit-par-lit' injection of aplitic material from the granite into the metamorphosed slate. Optical data are given for the several minerals. The biotite varies in character in the different zones, with γ 1.655 in the granite, 1.642-1.648 in the 'injection rocks', and 1.639 in the hornfelses and spotted slate.

L. J. S.

SUZUKI (Jun). *Petrological study of the crystalline schist system of Shikoku, Japan*. Journ. Fac. Sci. Hokkaido Imp. Univ. Sapporo, Japan, Ser. 4, 1930, vol. 1, no. 1, pp. 27-111, 4 pls., 13 text-figs. [Cf. M.A. 3-198.]

From the island of Shikoku many types of schists are described with chemical analyses. They show a wide range in chemical com-

position, but they have undergone a more or less uniform metamorphism: i.e. the rocks of the system are isophysical but not isochemical. The green schists, derived from basic igneous rocks and tuffs, include chlorite-schist, amphibolite, eclogite, glaucophane-schist, antigorite-schist, &c. Siliceous schists and calc-siliceous schists, derived from sedimentary rocks, include sericite-quartz-schist, piedmontite-quartz-schist, glaucophane-quartz-schist, crystalline limestone, &c. Another series of siliceous gneisses has been derived from acidic volcanic rocks.

L. J. S.

LACROIX (A.). *Sur un schiste cristallin à saphirine de Madagascar et sur les roches à saphirine en général.* Bull. Soc. Franç. Min., 1929, vol. 52, pp. 76-84.

Sapphirine is an essential constituent of anorthite-gneiss from Sakena, Madagascar. An analysis of the rock gives SiO_2 36.12, TiO_2 nil, Al_2O_3 40.51, Fe_2O_3 0.21, FeO 1.23, MnO 0.06, MgO 4.07, CaO 14.20, Na_2O 0.49, K_2O 0.92, P_2O_5 0.29, $\text{H}_2\text{O} +$ 1.40, $\text{H}_2\text{O} -$ 0.30, total 99.80. The author concludes from the presence at Sakena of phlogopite-schists rich in spinel that the sapphirine is a product of the metamorphism of the crystalline schist through the intrusion of granitic magma. A comparison is made with the sapphirine-bearing rocks from Fiskernäs, Greenland; Vizagapatam, Madras; and St. Urbain, Quebec. Sapphirine from crystalline schists is poor in iron, but when a constituent of eruptive rocks it may contain from 7.6 to 9.9 % iron. Its low silica content and high alumina and magnesia content explain its frequent association with spinel.

F. A. B.

LIGHTFOOT (B.). *The geology of the central part of the Wankie coalfield.* Southern Rhodesia, Geol. Survey Bull., 1929, no. 15, pp. 1-61, 1 map, 10 pls., 2 text-figs.

The author describes an interesting occurrence of 'para-lavas' from the neighbourhood of the Wankie colliery. They have been produced by spontaneous ignition in shales containing abundant coaly material mixed with pyrite. They resemble artificial slags and contain glassy patches containing anorthite, and an iron oxide, and sometimes also sillimanite. In similar 'para-lavas' from India L. L. Fermor has recorded in addition cordierite and enstatite. Igneous rocks described in this report are granitic gneisses, norite and dolerite intrusive in the gneisses, and the Batoka basalts closely

resembling the Stormberg basalts and probably of the same age. Large felspar crystals (sp. gr. 2.56) occur in the gneiss south of Wankie.

W. C. S.

LOMBAARD (B.). *The geology of a centrocline, 18 miles north-east of Pretoria.* Trans. Geol. Soc. S. Africa, 1930, vol. 32 (for 1929), pp. 151-164, 1 pl., 3 text-figs.

The chief matter of mineralogical interest is the occurrence of a body of fluorite-apatite-rock with accessory pyrite and quartz. The proportions of the principal minerals are approximately fluorite 58 %, apatite 18 %. Plugs of aegirine-foyaite occur in the neighbourhood, and the deposit appears to be a replacement of brecciated felsite.

S. J. S.

HADDING (Assar). *The pre-Quaternary sedimentary rocks of Sweden. III. The Paleozoic and Mesozoic sandstones of Sweden.* Acta Universitatis Lundensis (Lunds Universitets Årsskrift), N. F., avd. 2, vol. 25, no. 3 = Kungl. Fysiografiska Sällskapets Handlingar, Lund, 1929, N. F., vol. 40, no. 3, 287 pp., 138 figs.

This is a sequel to two previous contributions (1927) on the distribution of the sedimentary rocks of Sweden and on the conglomerates. After a general survey of the sandstones, an account is given of some selected Palaeozoic and Mesozoic examples from Sweden. The petrographical character, stratigraphical occurrence, and formation of the rocks are described. Finally, the classification of sandstones is discussed on the lines followed in the preceding section on the conglomerates. The author finds that petrographical characters do not provide a satisfactory basis for classification, and he proposes a scheme based on conditions of formation. A full discussion of glauconite and phosphorite-bearing sediments is promised in a later section of this work, and only brief reference is made to them. Phosphorite is not typical of the littoral zone, but it occurs beyond at a slightly greater depth. This work is a very useful addition to the literature of sedimentary rocks and the illustrations depicting the rocks, sandstones, quartzite, sparagmite, &c., both natural size and in thin sections magnified 60 diameters, are excellent. The adoption of a uniform scale of magnification for the photomicrographs greatly facilitates comparison.

W. C. S.

SCHERF (Emil). *Hévíforrások okozta kőzetelváltozások (hidrotermális kőzetmetamorfózis) a Buda-Pilisi hegységben.—Hydrotermale Gesteinsmetamorphose im Buda-Piliser Gebirge.* With appendix, German only: *Vergleich der hydrothermalen Gesteinsmetamorphose im Buda-Piliser Gebirge mit der alpinen Dynamometamorphose.* Hidrologiai Közlöny, Budapest, 1928, vol. 2 (for 1922), pp. 19–88 (Hung.), pp. 107–206 (Germ.), 2 pls., 3 text-figs.

The disintegration of dolomite in the Buda-Pilis Mts. to a loose crystalline powder is not due to weathering, but to recrystallization brought about by the action of local thermal waters charged with carbon dioxide. The limestones are altered in the same way, and they also give a characteristic type of soil. Certain red iron oxides, halloysite, and aluminium phosphate are also the products of this hydrothermal action, which takes place at temperatures not much over 100° C. and under ordinary pressure. The dolomite sand in the Swiss Alps is also due to a process of recrystallization, but here under high pressures and at temperatures above 200° C., the solvent being the moisture contained in the rocks.

V. Z.

PRÁT (Silvestr). *Studie o biolithogenesi. Vápenité řasy a Cyanophyceae a jejich význam při tvorení travertinů.* [Studies in biolithogenesis. Calcareous algae and Cyanophyceae and their importance in the formation of travertines.] Praha (Česká Akad.), 1929, 187 pp., 14 pls., 7 text-figs.

This monograph on the formation of travertine discusses previous literature and adds many new observations. The chapter-headings are: I, Introduction; II, nomenclature; III, review of the literature; IV, conditions for the segregation of calcium carbonate and different interpretations of the genesis of the sediments; V, p_H in natural waters; VI, rate of growth of sediments; VII, chemical composition of sediments; VIII, Cyanophyceae; IX, Diatomaceae, Rhodophyceae, Chlorophyceae, Characeae, mosses causing the segregation of calcium carbonate; X, non-green micro-organisms; XI, non-encrusting, perforating, and endolithic organisms; XII, precipitation of calcium carbonate in cultures; XIII, travertine occurrences in other countries; XIV, travertine occurrences in Czechoslovakia; XV, conclusions; XVI, bibliography (552 items). The subject is considered from chemical, physico-chemical, physiological, botanical, and geological points of view, and points of mineralogical interest are contained in chapters IV, VII, XIII, and XIV. In V many new colorimetric

determinations are given of the hydrogen-ion concentration in running waters depositing travertines (central Bohemia, Moravia, and Slovakia); in all these streams a decrease in acidity downwards is proved, whereas in waters coming from granitic and gneissic terrains (southern Bohemia and Norway) no regular change was observed. The encrustations of calcium carbonate on different algae were examined by F. Ulrich microscopically and by the Meigen reaction and proved to be calcite; only on Chara from the Jupiter Terrace, Yellowstone National Park, were spherules of aragonite determined. Travertine deposits occur in the Silurian in central Bohemia and in the Flysch region of SE. Moravia and Slovakia. The principal factors that determine the deposition of travertine are the assimilation activity of algae, concentration of hydrogen ions and of carbon dioxide depending on temperature, pressure, &c.; but these conditions are very variable both in space and time. F. S.

LASCH (H.). *Über Manganerzkonkretionen vom Zellersee bei Mondsee*. Min. Petr. Mitt. (Tschermak), 1930, vol. 40, pp. 294-296.

Concretions the size of a man's head were dredged from depths of 18-22 m. in the Zeller lake in Upper Austria, at two spots where there was also evidence of springs of carbon dioxide. They consist of sandy marl with a crust of wad, psilomelane, and limonite. Analysis of the crust gave MnO_2 13.92, MnO 2.86, Fe_2O_3 37.68, SiO_2 19.10, H_2O 18.32 %, &c. They are evidently formed by the metasomatic replacement of calcium carbonate by manganese and iron from carbonated springs. L. J. S.

NOLL (W.). *Die Sorption des Kaliums in tonigen Sedimenten und ihre Bedeutung für die Bildung des Kaliglimmers bei der Metamorphose*. Chemie der Erdé, 1930, vol. 6, pp. 1-50, 16 figs.

A long series of experiments with clays and various gels shows that kaolin takes up very little potassium from a potassium carbonate solution, but that with allophane clays the ratio $\text{K}_2\text{O}:\text{Al}_2\text{O}_3$ may approach 1:3. A sediment that had taken up this amount of potassium would yield muscovite when subjected to metamorphism. L. J. S.

MARTENS (James H. C.). *The mineral composition of some sands from Labrador, Quebec and Greenland*. Field Mus. Nat. Hist. Chicago, 1929, Publ. 260, Geol. Ser., vol. 5, no. 2, pp. 17-34, 3 figs.

The sands examined are from recently glaciated areas having now an arctic climate, and with one exception (a zeolitic sand from Disco

Island, Greenland) the materials have been derived from pre-Cambrian crystalline rocks. After separating the lighter and heavier portions in bromoform, the number of grains of each kind of mineral was counted under the microscope. Owing to the absence of chemical weathering, feldspars are prominent, and plagioclase usually exceeds potash-feldspar. In the heavy portion such minerals as zircon, rutile, tourmaline, and leucoxene (common in ordinary sands) are relatively rare, being diluted by other minerals; e.g. hornblende up to 63 % of the heavy portion, olivine 10 % in one sample, and sphene 13 % in another.

L. J. S.

TRAINER (David W., Jr.). *Mineral concentrates of beach sands*. Amer. Min., 1930, vol. 15, pp. 194-196, 1 fig.

Sands from the beach of Lake Ontario at Toronto were sorted according to size of grain and counts were made of the grains of different minerals. One sand consists mainly of magnetite and ilmenite and another of garnet and green hornblende. In the natural sorting of sands by currents, grain-size as well as specific gravity comes into play.

L. J. S.

WILKERSON (Albert S.). *A mineralogical examination of black sand from Nome Creek, Alaska*. Amer. Min., 1930, vol. 15, pp. 77-79.

Black sand from a gold-placer contained magnetite (with adhering films of haematite and limonite) 40.81, garnet 20.69, schist 11.27, pyrite and marcasite 10.30, quartz 9.31, wolframite 4.99, scheelite 2.13, feldspar 0.16, cassiterite 0.11, ilmenite 0.08, pyrrhotine 0.06, zircon 0.05, galena 0.04 = 100.

L. J. S.

STEWART (Duncan, Jr.). *Analyses and derivations of two beach sands from the Holsteinsborg district of Greenland*. Amer. Min., 1930, vol. 15, pp. 74-77, 1 fig.

A garnet-magnetite-hornblende-sand, derived from garnetiferous hornblende-gneiss, biotite-gneiss, and feldspar-quartz-pegmatite, contains garnet 38.37, magnetite 22.84, hornblende 19.42, ilmenite 8.45, tourmaline 5.54, feldspar 2.61, quartz 1.29, diopside 0.60, sphene 0.35 %, &c. This grades into a feldspar-quartz-sand, derived from granodiorite-gneiss, hornblende-gneiss, and feldspar-quartz-pegmatite, which contains feldspar 68.17, quartz 27.27, hornblende 3.97 %, &c.

L. J. S.

Economic Minerals and Ore-deposits.

- GIUSCĂ (Dan). *Étude chalcographique des sulfarsénites de la vallée de la Binna*. (Note préliminaire.) Bull. Sect. Sci. Acad. Roumaine, 1929, vol. 12, pp. 200–205 (= nos. 7–10, pp. 44–49), 1 pl.
- *Die Erze der Lagerstätte vom Lengenbach im Binnental (Wallis)*. Schweiz. Min. Petr. Mitt., 1930, vol. 10, pp. 152–177, 1 pl., 10 text-figs.

The several sulpharsenite minerals from Binn, Switzerland, have been examined on polished surfaces in polarized light, small fragments being embedded in plaster of Paris. By this method they show certain differences in colour, polarization colours, and etching with sodium hypochlorite. The species identified by crystallographic measurements and examined were jordanite, lengenbachite, dufrenoyite, rathite, liveingite, baumhauerite, sartorite, hutchinsonite, binnite, and seligmannite. They often show intimate intergrowths, due very probably to later replacements, the replacing minerals being successively richer in arsenic, silver, and thallium. The characters of liveingite are found to be intermediate between those of rathite ($3\text{PbS} \cdot 2\text{As}_2\text{S}_3$) and baumhauerite, and for this reason new formulae are suggested for liveingite $4\text{PbS} \cdot 3\text{As}_2\text{S}_3$ and baumhauerite $5\text{PbS} \cdot 4\text{As}_2\text{S}_3$.

L. J. S.

- THOMSON (Ellis). *Quantitative microscopic analysis*. Journ. Geol. Chicago, 1930, vol. 38, pp. 193–222, 54 figs.

The various micrometric methods are compared and tested on sections of ores. The linear measurements by the Rosiwal method are quicker and almost as accurate as the areal measurements by the Delesse method. Greater accuracy with less fatigue is obtained by making the measurements on enlarged photomicrographs or on lantern projections. Cross-sectioned grids of 100 squares are laid over the photomicrographs or lantern slides, and a series of quantitative photographic standards is suggested for quick comparison.

L. J. S.

- THOMSON (Ellis). *A Mineralographic study of the marcasite group*. Univ. Toronto Studies, Geol. Ser. 1930, no. 29, pp. 75–83, 1 pl.

The microscopical characters and micro-chemical reactions as determined on polished sections are given for marcasite, löllingite, mispickel, safflorite, rammelsbergite, and glaucodot. A specimen

labelled allocrase was found to contain no bismuth and was identified as nickel-skutterudite [cf. M.A. 4-332]. Nickel-skutterudite [from ?] has the form of elongated cubic crystals, which on etched sections show a zonal structure; analysis by A. R. Graham gave As 76.78, S 1.67, Ni 12.94, Co 7.78, Fe 1.04, insol. 0.44 = 100.65, sp. gr. 6.551.
L. J. S.

SCHWARTZ (G. M.). *The relations of magnetite and ilmenite in the magnetite deposits of the Duluth gabbro* [Minnesota]. Amer. Min., 1930, vol. 15, pp. 243-252, 12 figs.

Examination of polished sections etched with strong hydrochloric acid shows that ilmenite occurs as grains, as segregations around grains of magnetite, and as regular intergrowths along the octahedral planes of magnetite. Graphic intergrowths are noted between haematite and magnetite, ilmenite and hornblende, &c. L. J. S.

LAUSEN (Carl). *Graphic intergrowth of niccolite and chalcopyrite, Worthington mine, Sudbury* [Ontario]. Econ. Geol., 1930, vol. 25, pp. 356-364, 2 figs.

Polished sections of ore specimens suggest that the earliest minerals, gersdorffite and quartz, were shattered, and then maucherite, with slightly later niccolite, were introduced. At a later stage chalcopyrite was deposited, some of it replacing niccolite in graphic intergrowth. Alternative suggestions that this graphic intergrowth is due to the simultaneous (eutectic) growth of the two minerals, or to the unmixing of a solid solution, are rejected. L. J. S.

SCHNEIDERHÖHN (H.). *Mineralchemische und mikroskopische Beobachtungen an Blei-Zink- und Kieserzen der Deutsch-Bleischarley-Grube, Oberschlesien*. Chemie der Erde, 1930, vol. 5, pp. 385-395, 2 pls.

The lead-zinc and pyrites ores of the Deutsch-Bleischarley mine, Upper Silesia, are known to contain arsenic, and they were examined by the metallographic method for arsenic minerals. In the lead-zinc ore, shelly blende surrounds cores of galena and jordanite [$\text{Pb}_4\text{As}_2\text{S}_7$], and a small amount of meneghinite was detected. But in the pyrites ore, containing pyrite, marcasite, and shelly blende, no arsenic mineral could be detected. Chemical tests showed that much arsenic is present in the pure pyrite (no doubt in isomorphous mixture) and only traces in the marcasite and blende. L. J. S.

LINDGREN (Waldemar). *Pseudo-eutectic textures*. Econ. Geol., 1930, vol. 25, pp. 1-13, 12 figs.

Intimate intergrowths of bornite and chalcosine have been thought to represent a replacement of bornite by chalcosine or a simultaneous deposition of the two minerals. A similar texture is now described between stromeyerite and tennantite as shown on polished sections of silver ore from Colquijirca mine, Cerro de Pasco, Peru [M.A. 4-228]. The stromeyerite presents curved contacts against the tennantite, suggesting the replacement of tennantite by stromeyerite. Other pairs of ore minerals showing this kind of texture are listed. L. J. S.

THIRION (Ch.). *Sur la géologie et la métallogénie des environs de Tré-muson (Côtes-du-Nord)*. Bull. Soc. Franç. Min., 1929, vol. 52, pp. 60-69, 3 pls., 2 figs.

The region under discussion is situated 5 km. to the north-west of Saint-Brieuc and consists of a diorite dome flanked on the north by mica- and amphibole-schists, on the south by very uniform granulitic gneiss. Metalliferous deposits, rich in lead, are found in the schists and contain pyrite, mispickel, chalcopyrite, blende, bournonite, galena, and tetrahedrite. The galena occurs sometimes as large deformed crystals, but more usually as finely striated compact masses distinguished with difficulty from the enclosing rocks. The gangue is made up of quartz, chiefly chalcedony, and chalybite, the latter forming a yellow saccharoidal compact mass showing under the microscope small rhombohedra. F. A. B.

BOYDELL (H. C.). *The solubility of cassiterite*. Trans. Inst. Mining Metall. London, 1928, vol. 37 (for 1927-8), pp. 1-17.

Contradictory statements respecting the solubility of cassiterite in water containing various reagents are quoted from the literature. Evidence for the secondary enrichment of cassiterite in lodes is also wanting. L. J. S.

GEVERS (T. W.). *A hydrothermal deposit of cassiterite near Arandis, South-West Africa*. Trans. Geol. Soc. S. Africa, 1930, vol. 32 (for 1929), pp. 165-170, 1 fig.

Arandis is some 40 miles inland from Swakopmund. The deposits are in crystalline limestone which was invaded by the Salem granite and its apophyses; but the ore, instead of occurring in pegmatite reefs as in the Erongo area, is in irregular lodes and drusy cavities

in the limestone. It is associated with vein quartz, arsenopyrite, pyrrhotine, pyrite, and bornite. Outcrops of the lodes are indicated by heavy brown boulders containing limonite, quartz, and cassiterite. The cassiterite is remarkably pure and massive, and blocks weighing over 250 lb. have been extracted. A new tin mineral, which has been named arandisite [M.A. 4-248], occurs in some of the lodes, and native bismuth has also been observed.

S. J. S.

GEVERS (T. W.) & FROMMURZE (H. F.). *The tin-bearing pegmatites of the Erongo area, South-West Africa*. Trans. Geol. Soc. S. Africa, 1930, vol. 32 (for 1929), pp. 111-149, 2 pls., 7 text-figs.

The Erongo tinfield, in the north-western portion of Damara land, extends from Karibib to the southern limit of the Kaokoveld, a distance of 140 miles. Within this area there are three well-defined belts of tin-bearing pegmatites, the orientation of which is determined by the strike of the ancient schist series and the contacts of the intruded 'older' granite. Pegmatite reefs are abundant in the granite, especially near its margins, but they are still more strongly developed in the schists. When the country-rock is crystalline limestone, pegmatite is rare. Of 1710 pegmatites that were examined, 79 % were parallel to the strike of the schists. The width of the reefs varies from a few inches to 50 feet or more, decreasing with increasing distance from the granite margin. The pegmatites in the granite and close to its margins carry tourmaline and spessartine garnet, but seldom carry tin. The tin-bearing pegmatites in the schist have the same gangue-minerals as the tourmaline-pegmatites, namely, orthoclase, microcline, primary albite, microperthite, and quartz, some of the latter being secondary. The cassiterite is generally distributed in definite zones and bands of replacement which are definitely related to the contours of the dike. The mineral is in well-formed crystals, grains, and sometimes large masses, one of which weighed 500 lb. Such masses are found where the pegmatite has been intensely greisenized. Most of the cassiterite is brown to black, but ruby-tin is found at Otjimbojo. Both tourmaline and cassiterite are secondary minerals introduced at the expense of feldspar and quartz. The change was accompanied by the albitization of feldspar on a large scale, and tourmaline replaces both primary feldspar and secondary albite. Cassiterite replaces both feldspar and quartz, but especially feldspar. The intimate association of tourmaline and cassiterite suggests that these minerals were deposited almost contem-

poraneously, At Paukwab, small bipyramidal crystals of cassiterite occur in large, uniform microcline crystals, the bands of the former being parallel to the zonal growth and cleavage-planes of the felspar. Some of the pegmatites carry muscovite, lepidolite, and coloured lithia-tourmaline. Other minerals present in certain cases are triplite, wolframite, argentiferous bismuthinite, bismutite and bismuth-ochre, cookeite, lazulite, apatite, fluorite, beryl, tantalite, monazite, columbite, molybdenite, arsenopyrite, chalcopyrite, and bornite.

S. J. S.

BOND (G. W.). *Notes on the mineralised belt of Jamestown series, Forbes Reef—northern Swaziland.* Trans. Geol. Soc. S. Africa, 1930, vol. 32 (for 1929), pp. 177–186, 1 pl.

Forbes reef was first opened up in 1880; it is one of the oldest mining areas in South Africa. A general account of the geology of northern Swaziland is given, with brief notes on the economic deposits. Cassiterite appears as 'black tin' in pegmatite and as 'ruby-tin' in schist near the pegmatite. Alluvial tin was worked for many years in the neighbourhood of M'Babaan. Scheelite and monazite have also been recovered from alluvial deposits. Cinnabar and crocoite have been observed in some of the gold reefs. The latter are partly quartz reefs and blows and partly impregnations. £300,000 worth of gold was extracted from one large blow in the eighties of last century. The impregnations in silicified dolomite carry gold along with pyrite and arsenopyrite.

S. J. S.

REINECKE (Leopold) & STEIN (W. G. A.). *Ore bodies of the Pilgrims Rest goldfield.* Trans. Geol. Soc. S. Africa, 1930, vol. 32 (for 1929), pp. 65–88, 1 pl., 5 text-figs.

The geology of this goldfield in Transvaal has been described in Memoirs 5 and 23 of the Geological Survey of South Africa. The ore is found in the Transvaal system, especially its middle member, the dolomite. The reefs are both bedded and transverse. The bedded reefs are two to eight feet thick and replace beds of shale in the dolomite. Besides quartz and pyrite, the following minerals have been found in very small quantity: tetrahedrite, atacamite, chessylite, chrysocolla, malachite, tenorite, chalcopyrite, and zinc-blende. The cause of the mineralization was the intrusion of a granite batholith into the lowest part of the Transvaal system.

S. J. S.

KEEP (F. E.). *The geology of the chromite and asbestos deposits of the Umvukwe Range, Lomagundi and Mazoe districts.* Southern Rhodesia, Geol. Survey Bull., 1930, no. 16, 105 pp., 1 map, 15 pls.

This report describes the geology of an area of about 144 square miles near the northern end of the Great Dyke. The rocks present are (1) granite, (2) basic eruptive rocks of the Great Dyke, (3) dolerite dikes, (4) alluvium. The junction of the Great Dyke with the granite can be seen at two points only, and there the basic rocks of the Dyke have been converted into talc-schist and serpentine, the foliation of the schist dipping inwards at about 50° . The main mass of the Dyke consists of serpentized harzburgite with minor amounts of enstatite-rock and websterite. Chromite occurs in seams about 7 inches thick (maximum 30 inches) which dip towards the middle of the Dyke at about 30° . The foot- and hanging-walls are usually of serpentine, but a seam has also been found in unserpentized websterite. The asbestos deposit of the Ethel mine occurs in serpentine. The chrysotile seams, with which some fibrous brucite is associated, show the usual tendency to occur in rich zones separated by zones of almost barren serpentine. The asbestos is apparently older than the dolerite dikes, for in one of the adits a seam of asbestos has been destroyed by the action of a dolerite intrusion. The petrology of the rocks is described in some detail, with several analyses of fresh and weathered rocks and the soils derived from them. Mineralogical rarities are garnierite, maufite [M.A. 4-248], and a green garnet assumed to be uvarovite. The concluding sections deal with the origin of the Great Dyke and the genesis of the chromite and asbestos deposits. Three analyses of the chrome-ore show it to be chrompicotite containing Cr_2O_3 52.8 to 55.4 %. The proportion of ore within the mapped area, to an incline-depth of a hundred feet, is between two and three million tons. S. J. S.

KITSON (Sir Albert E.). *Manganese ore deposits of the Gold Coast, Africa.* Trans. Amer. Inst. Mining & Metall. Engineers, 1927, vol. 75, pp. 372-384, 6 figs.; with:—

JUNNER (N. R.). *Notes on the petrology of certain associated manganese silicate-bearing rocks.* Ibid., pp. 385-395, figs. 7-14.

Certain beds of slates and phyllites of the widespread Birrim System (pre-Cambrian) contain variable amounts of manganese of sedimentary origin. These sediments have been intruded by granites, &c., and in some districts they have been much altered by pressure-

metamorphism, giving para-gneisses and schists with manganese silicates. Many localities in Gold Coast Colony, Ashanti, and the Northern Territories are noted for such deposits, but they are not of economic value. At certain places, however, there has been a concentration of the manganese by weathering agencies, producing workable deposits of massive or concretionary types. The deposit at Insuta and Dagwin near Tarkwa is the most important. The principal mineral appears to be psilomelane, with less pyrolusite, and a little manganite and polianite. In the metamorphic areas there are fine-grained rocks composed of manganese-garnet and quartz (like Indian gondite), manganese-garnet and manganese oxides, or rhodonite and manganese-garnet. Analysis by H. L. Riley of the garnet separated from the garnet-quartz-rock near Bongfu, Northern Territories, gave SiO_2 39.75, TiO_2 0.26, Al_2O_3 19.94, Fe_2O_3 3.76, FeO 4.54, MnO 24.25, MgO 1.51, CaO 5.53, H_2O 0.55 = 100.09, corresponding with 60 % of spessartine. L. J. S.

DINES (H. G.). *Uranium in Cornwall*. Mining Mag. London, 1930, vol. 42, pp. 213-217, 1 fig.

A list of mines is given where uranium minerals (pitchblende, torbernite, autunite, and zippeite) have been found, but in most cases only in quite small amounts. L. J. S.

IGNATIEFF (A.). *Magnesite deposits in Serbia*. Mining Mag. London, 1930, vol. 42, pp. 217-221, 5 figs.

Compact magnesite is found scattered throughout central Serbian Macedonia, and larger deposits are worked 25 km. south of Skoplie in the Vardar valley. It occurs near the surface in pockets and interrupted veins along lines of fissure in serpentine, which has been derived from peridotite. Analysis of a picked sample gave MgCO_3 98.25, CaCO_3 1.16, Fe_2O_3 0.28, SiO_2 0.12 %. The mineral is supposed to have been formed by the action of magmatic water containing carbon dioxide on the olivine and enstatite of the peridotite, the serpentine being also a product of the same reaction. To a smaller extent the same change may also have been effected by ground water charged with carbon dioxide. L. J. S.

SPENCE (H. S.). *Mica*. Canada, Mines Branch, 1929, no. 701, ix + 142 pp., 3 maps, 1 chart, 21 pls., 9 text-figs. Price 30 cents.

This useful monograph on the production and uses of mica is a new edition of the previous reports issued by the Canadian Mines

Branch in 1905 and 1912. It deals mainly with Canadian occurrences, mining, and preparation for the market; including in addition to phlogopite, also muscovite, fuchsite, and lepidolite. The occurrence and production of mica in other countries are also briefly considered.

L. J. S.

COLE (L. Heber). *The gypsum industry of Canada*. Canada, Mines Branch, 1930, no. 714, viii + 164 pp., 25 pls., maps, and tables, 23 text-figs. Price 30 cents.

An account is given of the many known occurrences of gypsum in each of the provinces, those of Nova Scotia being the most important. There are chapters on the testing, technology, and uses of gypsum and gypsum plasters.

L. J. S.

WILSON (M. E.). *Fluorspar deposits of Canada*. Canada, Dept. of Mines, Geol. Survey, 1929, no. 2210 (Econ. Geol. Ser. no. 6), vii + 97 pp., 4 pls., 14 text-figs. Price 20 cents.

A large number of fluorite occurrences in British Columbia and Ontario are described in detail. Those in eastern Canada and foreign countries are briefly mentioned. The only deposits that have been worked are those near Madoc, Ontario, and near Grand Forks, British Columbia. The consumption in 1928 amounted to 14,362 tons. Near Madoc, the fluorite, associated with baryte, calcite, celestine, &c., occurs in veins in Palaeozoic sediments that have been intruded by granite. At Rock Candy, in the Grand Forks mining division, the fluorite deposit is in syenite.

L. J. S.

EHMANN (Emil A.). *Chemische Untersuchungen über die Entstehung württembergischer Bohnerze*. Chemie der Erde, 1930, vol. 6, pp. 117-142.

The pisolitic iron ores of the Swabian Alps occur in association with limestones, of which they are the residual products, representing 'fossil laterites'. Detailed analyses are given of the ores from several localities, and of the portions soluble in acids of various strengths. They are clayey limonites, but the clay material is not simply kaolin. Analyses are also given of the limestones and of the residue left when they are dissolved in acid. The amount of iodine in the ores and in the associated limestones gives further indication of the origin of the ores. The White Jura limestone is richer in iodine (0.95 mg/kg) than the Muschelkalk (0.26 mg/kg); and the ores asso-

ciated with the former are correspondingly richer in iodine (0.32–0.47) than those (0.02–0.11) associated with the Muschelkalk.

L. J. S.

HARRASSOWITZ (Hermann). *Südeuropäische Roterde*. Chemie der Erde, 1928, vol. 4, pp. 1–11.

Red earths beneath the humus-bearing soil of the Black Forest in Baden contain in the hydrochloric acid extract a higher silica to alumina ratio, namely, 2.5–2.98, than those from farther south. The ratio is as low as 0.17–0.5 in the red earth from Lake Garda in Italy. The latter, like the 'terra rossa' of the Karst region, contains free alumina. The 'terra rossa' rests on pure limestones, and the red colour is not confined to the Mediterranean type of weathering.

L. J. S.

DUNN (J. A.). *The aluminous refractory minerals: kyanite, sillimanite and corundum in northern India*. Mem. Geol. Survey India, 1929, vol. 52, pp. i–iv, 145–274, i–xxi, 13 pls., 5 text-figs.

An outline of the mineralogy and an historical review of the use of these minerals as refractory materials are followed by detailed geological descriptions of their occurrence in crystalline rocks, with estimates of the amounts available, in the following districts: Sona Pahar, Assam; Pipra, Rewa; Pohra, Bhandara; Barabhum, Manbhum; Lapsa Buru, Kharsawan State; Seraikela State; Dhalbhum subdivision, Singhbhum.

L. J. S.

MATSUBARA (Atsushi). *On the self-electrification of sulphide orebodies*. Japanese Journ. Geol. Geogr., 1930, vol. 7, pp. 59–73, 1 fig.

Local differences in the surface potential of an ore-body are principally due to the differences of concentration of hydrogen and hydrosulphide (SH') ions in the ground-water. The latter may be attributed to local variations in the rate of atmospheric oxidation.

F. A. B.

Meteorites.

DE FIORE (O.). *Le meteoriti del museo mineralogico della R. Università di Napoli*. Boll. Soc. Nat. Napoli, 1930, vol. 41 (for 1929), pp. 68–71.

A list is given of the 29 meteoritic falls represented in the collection, with a total weight of 15,726 grams. They are mostly small fragments, except a piece of 7583 grams of the Toluca iron.

Moldavites listed under the names Budweiss and Moldauthein are also included.

L. J. S.

SALOMON (Wilh.). *Historisches über Meteoriten bei Siena (1794)*.

Mitteilungen zur Geschichte der Medizin u. der Naturwissenschaften, 1930, vol. 29, no. 2, reprint 1 p.

Quotes some historical details from G. Martineghi, 'Supplimento . . . del Museo Mineralogico dell' Università di Pavia' (Pavia, 1802).

L. J. S.

ZENZÉN (Nils). *Preliminary note on the Lillaverke meteorite*. Geol.

För. Förh. Stockholm, 1930, vol. 52, pp. 366-369, 3 figs.

Preceded by a detonation and sounds, a non-luminous body was observed to fall at 4 p.m. on May 11, 1930, at the village of Lillaverke, Oskar parish, Kalmar län, Småland, SE. Sweden [about $56^{\circ} 40' \text{ N.}$, 16° E.]. It penetrated the soil to a depth of 45 cm. and was rather warm when taken out. It is an angular fragment almost completely covered with a dull black crust, and it weighs 6862 grams (sp. gr. about 3.1). It has the appearance of a chondrite with some black veins.

L. J. S.

GERBER (Ed.). *Vorläufige Mitteilung über den Meteorstein von Ulmiz*.

Mitt. Naturfors. Gesell. Bern, 1928, for 1927, pp. xi-xii.

HUGI (E.). *Der Meteorit von Ulmiz (Kt. Freiburg)*. Ibid., 1930, for 1929, pp. 34-121, 18 pls., 2 text-figs.

A meteoric stone was observed to fall at 6.50 a.m. on December 25, 1926, at Ulmiz ($46^{\circ} 56' \text{ N.}$, $7^{\circ} 12' \text{ E.}$), near Murten, canton Freiburg, Switzerland. It fell on frozen ground, and ten small fragments with a total weight of 76.5 grams (the largest piece 26 grams) were picked up. The crust shows, especially on the rear side of the stone, the fused, absorption, and impregnation zones of Tschermak. Between the first and second of these zones there is, in places, a recrystallization zone with fibrous structure (called the 'Faser-zone'). Monosomatic and polysomatic chondrules of olivine, enstatite, or clinoenstatite and mixed chondrules of olivine and enstatite are set in a brecciated tuffaceous matrix, and the stone is classed as a crystalline spherical chondrite. Analysis by F. de Quervain gave SiO_2 40.24, TiO_2 0.33, Al_2O_3 1.72, Cr_2O_3 0.74, total Fe as Fe_2O_3 27.01, Ni 1.85, MgO 26.29, CaO 3.76, Na_2O 0.61, K_2O 0.26, $\text{H}_2\text{O} +$ 0.22, $\text{H}_2\text{O} -$ 0.08, P 0.24, S 2.48, total 105.83, corresponding with olivine 41.5, enstatite and clinoenstatite 33.2, felspar glass 8.5,

nickel-iron (Fe 6.2, Ni 1.6) 7.8, troilite 6.8, chromite 1.1, schreibersite 1.1%. Sp. gr. 3.655. Mention is made of eight Swiss meteorites (one of which fell at Walkringen, Bern, on May 18, 1698, but since lost), only four of which, however, were actually found and preserved.

L. J. S.

GERBER (Ed.). *Vorläufige Mitteilung über den Meteorstein von Utzenstorf (Unteremmental), Kanton Bern*. Mitt. Naturfors. Gesell. Bern, 1929, for 1928, pp. 25-31, 1 pl.

With the accompaniment of roaring noises a luminous body 'as big as the moon' was observed to fall on the farm Stigli at Utzenstorf, canton Bern, Switzerland, at 7 p.m. on August 16, 1928. Eleven days afterwards a stone broken into three pieces was found nearby in a hole 25 cm. deep. The total weight of the three pieces is 3422 grams (the largest piece 2764 grams). With the pieces fitted together, the mass is shield shaped, 22×14 cm. with a greatest thickness of 8 cm. The front convex surface is reddish-brown in colour and shows well-marked stream-lines radiating from an apex situated towards one side of the stone. There was a flow of material over the edge to the back of the stone. The back is darker in colour and shows 'thumb-mark' pittings. The structure of the stone is chondritic, and troilite and metal are seen on the fractured surface.

L. J. S.

MERCANTON (P. L.). *Présentation de la météorite de Pfullingen*. Bull. Soc. Vaudoise Sci. Nat., 1929, vol. 57, p. 59.

At Pfullingen, near Tübingen, in Württemberg, at 4 p.m. on October 29, 1904, there was a momentary darkening of the sky and an explosion, and in a large hole in a meadow in the Echaz valley a mass weighing $7\frac{1}{2}$ kg. was found. This was acquired by Dr. Alfred Ney. The density indicates that it is a holosiderite, and a polished surface shows Widmanstätten figures.

L. J. S.

J. (A.). *Das Hanauer Meteoriten vom August 1877*. Ber. Senckenb. Naturfors. Gesell. (Natur und Museum), Frankfurt am Main, 1928, vol. 58, pp. 333-335.

Reproduces a contemporary newspaper account of the fall at Hanau, Hesse-Nassau, on August 21, 1877, of an alleged meteorite. A hot stone the size of a pea, weighing 0.37 gram with sp. gr. nearly 4, was picked up. No trace of this can now be found in local collections, and the record is evidently doubtful.

L. J. S.

Meteoritas, krites Lietuvoje 1929 metų vasario mėn. 9 dieną. [Meteorite fallen in Lithuania 1929 year February month 9 day.] Lietuvos Universiteto Matematikos-Gamtos Fakulteto Darbai (Mém. Fac. Sci. Univ. Lithuanie, Sect. Math.), Kaunas [= Kovno], 1930, vol. 5 (for 1929-30), pp. 131-170, 6 pls., 5 text-figs. (Lithuanian with German summaries.)

SLEŽEVIČIUS (K.). *I. Meteorito ieškojimas.—Die Aufsuchung der im Jahre 1929 niedergefallenen Meteoriten.* (pp. 131-140.)

KODATIS (B.). *II. Rastųjų meteoritų identifikacija ir orbitos susekimas.—Bahnbestimmung und Identifikationsbeweis der gefundenen Meteoriten.* (pp. 141-150.)

KAVECKIS (M.). *III. Meteoritų sąstatas ir jų apibūdinimas.—Kurze Zusammenfassung der Erforschung des in Litauen niedergefallenen [sic] Meteorits.* (pp. 151-169.)

A meteor accompanied by a bright light and a detonation was observed in Lithuania in the clear night sky at 12.45 a.m. (M.E.T.) on February 9, 1929, and some months afterwards eleven stones with a total weight of 3858 grams (the largest 2128, and the smallest 27.8 grams) were collected over an area of 10 sq. km. near the village Padvarninkai (55° 40' N., 25° E.), district Androniškis. The observed time of flight of the meteor was between 4 and 5 seconds, and the estimated length of its path 269 km. The height of the radiation point is estimated at 86 km. and of the arrest point at 20 km. The stones show a black shining crust, which penetrates along veins into the interior. The fractured surface shows a brecciated structure of: (1) a dark grey portion (sp. gr. 3.18) resembling a porous basaltic lava and containing metallic specks; (2) a patchy grey portion (sp. gr. 2.95); and (3) a light grey portion (sp. gr. 2.88) with black veins. Micro-sections show the presence of anorthite with some isotropic maskelynite, and in the dark portions augite, magnetite, and iron sulphide. The meteorite belongs to the eucrite group and is compared with sherghottite (and also with angrite). Analysis gave: SiO₂ 47.21, Al₂O₃ 10.49, Fe₂O₃ 2.70, FeO 13.74, MgO 9.00, CaO 12.18, Na₂O 1.20, K₂O 0.86, S 0.51, C 0.43, Fe 1.56, Mn trace = 99.88, but the composition is variable. Fusion experiments show that the darker portion is melted at 1245°, whereas the lighter portion is only slightly affected. [A distinctive name is not given for this meteorite, and no mention is made of the previously known Lithuanian meteorites—Jodzie, Novy-Projekt, and Zabrodje. It may be called the Padvarninkai meteorite.]

L. J. S.

BRAUNS (R.). *Einige Bemerkungen zu dem in Litauen niedergefallenen Meteoriten.* Centr. Min., Abt. A, 1930, pp. 401-407, 3 figs.

Micro-sections of the new Lithuanian meteorite (preceding abstract) show fissured grains of monoclinic pyroxene and optically isotropic laths of maskelynite. The texture is much the same as that of a dolerite, and the meteorite is classed as a sherghottite of the eucrite group. The laths of maskelynite show a twin-suture and minute canals suggesting peg-structure; they represent crystals of a lime-soda-felspar fused just to the softening point. Opaque grains are referred to magnetite. No hypersthene, clinoenstatite, or metal was detected. A new analysis by Biel, differing somewhat from the earlier analysis, gave SiO_2 46.78, Al_2O_3 12.05, Fe_2O_3 3.81, FeO 16.34, MgO 6.78, CaO 10.86, Na_2O 2.11, K_2O 1.97 = 100.70, corresponding with felspar 44.28, $(\text{Mg,Ca,Fe})\text{SiO}_3$ 40.98, magnetite 3.06, and FeO 11.68%. The excess of FeO is perhaps in solid solution in the pyroxene, and a deficiency of lime in the pyroxene is also explained by solid solution of $(\text{Mg,Fe})\text{SiO}_3$. Analyses of the maskelynite and pyroxene constituents of sherghottite are desirable. L. J. S.

[GRISHCHINSKY (P. I.)] Грищинский (П. И.). К вопросу о падении метеоритов в области между реками Днепром и Припятью.—GRISCHTSCHINSKY (P. J.). *Zur Frage über den Fall von Meteoriten in der Gegend zwischen den Flüssen Dnjeper und Pripjat.* Зап. Київ. Тов. Природ. = Зап. Киев. Общ. Ест. (Mém. Soc. Nat. Kiew), 1928, vol. 27, no. 3, pp. 8-18, 5 figs.

— Поездка за метеоритом в с. Круки Речицкого уезда Минской губ.—*Fahrt nach einem Meteorit in Dorf Kruki [Rechitzka district] Gouvernement Minsk.* Ibid., pp. 19-23. (Russ. with German title on cover.) [Cf. M.A. 4-260.]

The late author (d. 1920) had collected information respecting the more recently found masses of the Brahin pallasite in the region between the rivers Dnepr and Pripyat, govt. Minsk. The following masses are regarded to be well authenticated: (1) 60 kg. found in 1907-8 at 'Kutzovka' near Kaporenki village, and now in the Girls' High School at Rechitza [cf. M.A. 3-256]. (2) 25 kg. found 1898-1900 at the same place and since lost. (3) 183 kg. found 1890-92 at Kruki village, and now in the Mineralogical Institute of the University of Kiev. (4) and (5) 45 and 32 kg. found at Kolyban village, and formerly in the possession of the late Prof. P. J. Armashevsky of Kiev. Other masses of which the information is less certain (and

the weights only approximate) are: (i) 500 kg. from Zamoshe, in the possession of the peasant Golubev. (ii) 280 kg. found at 40–50 versts from Mozyr. (iii) 250 kg. found in 1911 at Kruki, and held by the villagers there. (iv) 90 kg., the shape of a horn, at Posudov village, and held by the peasants there. (v) and (vi) 120 and 8 kg. at Posudov. (vii) 30 kg. at the place 'Starina'. (viii) Fifteen to twenty masses with a total weight of about 200 kg. at Chikalovich. The author considers that all these masses belong to the same fall, but he suggests that a recurrence of falls of similar material at the same spot is not impossible. The figures reproduce photographs of the Kolyban and Kaporenki (Kutzovka) masses. The second paper gives some details about the author's expeditions. P. N. C.

[CHIRVINSKY (P. N.)] Чирвинский (П. Н.). Микроскопическое и химическое исследование метеорита из Томаковки, Екатеринославской губернии, упавшего 4/17 января 1905 года.—TCHIRVINSKY (Pierre). *Analyse microscopique et chimique de la météorite de Tomakovka du gouvernement d'Ekaterinoslav*. Изв. Дон. Политех. Инст. Новочеркасск (Ann. Inst. Polytech. Novotcherkassk), 1930, vol. 14, pp. 2–23, 6 figs. (Russ. with French résumé, pp. 18–23.)
A repetition of earlier papers [M.A. 2–33]. L. J. S.

COULSON (A. L.). *The Naoki (Hyderabad) meteoric shower of the 29th September, 1928*. Rec. Geol. Survey India, 1930, vol. 62, pp. 444–451, 7 pls., 1 text-fig.

At 5 p.m. on September 29, 1928, two stones of 4920 and 1762 grams were observed to fall about a mile apart near the village of Naoki ($19^{\circ} 14\frac{1}{2}'$ N., $77^{\circ} 0'$ E.) in the Parbhani district. Two other stones, not recovered, fell about a mile away near the villages of Korgaon and Mategaon. The structure is that of a grey chondrite (Brezina's Cg), with olivine, enstatite, and glass, and much nickel-iron and troilite. Sp. gr. 3.701. L. J. S.

SELGA (Miguel). *Meteorites in the Philippines.—Meteoritos en Filipinas*. Publications of the Manila Observatory, Manila, 1930, vol. 1, no. 9, pp. 3–26 (English), pp. 27–52 (Spanish), 2 pls.

Records of seventeen cases are collected, of which only two relate to meteorites actually found and fragments preserved; twelve are of meteors observed since the year 1618, and three of pseudo-meteorites (large blocks of limestone). The main mass of the

Mexico (= Pampanga) stone of $10\frac{1}{2}$ kg., fell April 4, 1859, has been lost. The Calivo meteorite was observed to fall in the afternoon of May 26, 1916, in the suburb Tinigao of the town Calivo, island of Panay [$122^{\circ} 40' \text{ E.}$, $11^{\circ} 40' \text{ N.}$ about], and weighed 2400 grams; but only recently have fragments been obtained for investigation. The fractured surface is ash-grey with rusty brown spots; no chondrules are evident; sp. gr. 3.66. Thin sections show a brecciated structure with enstatite and much metal as acicular clusters penetrating the siliceous material. A preliminary analysis by G. O. Opiana gave SiO_2 41.84, FeO 21.26, MgO 27.92, Fe (total) 18.77 [= 109.79]; and an analysis by L. A. Faustino of another fragment gave SiO_2 38.53, Al_2O_3 15.57, FeO 7.11, NiO 2.06, MnO 0.35, MgO 1.20, CaO 10.32, Na_2O 0.73, K_2O 0.25, P_2O_5 0.16, Cl 1.69, S 2.83, Fe 19.03 [= 99.83]. [These analyses are evidently faulty; no mention is made of Ni.] This meteorite is classed [evidently incorrectly] as a siderolite. Under the heading 'prehistoric meteorites' mention is made of tektites ('kosmolites', 'rizalites') found by H. O. Beyer in 1926 in prehistoric sites mainly in the province Rizal, and a few in prov. Nueva Ecija and prov. Batangas, island of Luzon. They are spherical or cylindrical masses of dark olive-green or greenish-brown glass with curiously pitted surfaces. In chemical composition they are stated by Beyer to be nearer to australites than to billitonites.

L. J. S.

SPENCER (L. J.). *Meteoric irons from South-West Africa*. Nat. Hist. Mag. British Museum (Natural History), 1930, vol. 2, pp. 240-246, 5 figs.

A popular account of the irons of the Bethany (Gibeon) shower and of the large mass of iron estimated to weigh 60 tons at Hoba near Grootfontein [M.A. 4-261, Min. Mag. 22-272]. The latter is the largest known authentic meteorite.

L. J. S.

WYLIE (Charles Clayton). *The Tilden meteor, an Illinois daylight fall*. Science, New York, 1927, n. ser., vol. 66, p. 451.

CROOK (A. R.) & FARRINGTON (O. C.). *The Tilden meteorites*. Trans. Illinois Acad. Sci., 1930, vol. 22, pp. 442-449, 4 figs.

At Tilden, Illinois, about 1 p.m. on July 13, 1927, after three explosions and humming noises, three stones were seen to fall, the largest and the smallest at a distance of two miles apart. The stones weighed 9, 46, and 110 lb., and they penetrated clay soil to

depths of 9, 17, and 48 inches respectively. They were completely covered with a thin black crust, and were cold when found. The material consists of a friable granular aggregate of olivine with enstatite and irregular particles of nickel-iron. Rusty-brown specks are shown on freshly fractured surfaces. Chondrules are few and indistinct, and the meteorite is classed with Brezina's 'white chondrites'. Sp. gr. 3.49. Analysis by H. W. Nichols gave Fe 6.38, Ni 0.31, Co 0.02, S 2.31, P 0.15, SiO₂ 41.22, Al₂O₃ 3.69, FeO 22.28, NiO 0.99, CoO 0.04, MgO 22.30, CaO 0.91, Na₂O 0.53, K₂O 0.00, H₂O 0.03, total (less 1.38 O for S and P) 99.78.

L. J. S.

BRADY (L. F.). *Pre-historic Arizona meteorite*. Pan-Amer. Geol., 1929, vol. 51, pp. 287-288. [Cf. M.A. 4-263.]

PALACHE (Charles) & GONYER (F. A.). *A new iron meteorite from Carbo, Mexico*. Amer. Min., 1930, vol. 15, pp. 388-389, 1 pl.

A mass of about 1000 lb. was found in 1923 on the Alamo Ranch (29° 40' N., 111° 30' W.), about 40 miles west of Carbo in Sonora. In addition to the usual rounded depressions on the surface, there are a number of cylindrical pits (7 cm. deep and 1½ cm. diam.) resembling drill-holes; these were probably occupied by troilite. The structure is that of a medium octahedrite. Reichenbach lamellae of schreibersite cut across the Widmanstätten figures, and nodules of troilite are bordered by schreibersite. Analysis gave Fe 90.64, Ni 8.68, Co 0.36, Cu trace, Mn nil, P 0.16, S 0.03, insol. 0.04 = 99.91.

L. J. S.

HERRERO DUCLOUX (Enrique). *Nota sobre el meteorito de Santa Isabel*. Rev. Fac. Quím. Univ. Nac. La Plata, 1926, vol. 4, pt. 1, pp. 23-29, 3 pls.

The Santa Isabel chondrite [M.A. 3-389] has a specific gravity of 3.540, and analyses of the magnetic and non-magnetic portions gave the bulk composition: SiO₂ 41.755, TiO₂ trace, P₂O₅ 0.193, Cr₂O₃ 0.672, Al₂O₃ 2.984, Fe₂O₃ 0.081, FeO 17.900, NiO 1.021, CoO trace, MnO 0.398, MgO 20.624, CaO 2.577, Na₂O 0.672, K₂O 0.245, Fe (as troilite) 4.961, S 2.835, Fe 3.414, Ni 0.390, Co 0.015, Mn trace, corresponding with feldspar 10.99, diopside 6.65, hypersthene 39.74, olivine 31.19, chromite 0.89, apatite 0.31, troilite 7.79, nickel-iron 3.81.

L. J. S.

HERRERO DUCLOUX (Enrique). *Nota sobre el meteorito de Pampa del Infierno*. Rev. Fac. Quím. Farm. Univ. Nac. La Plata, 1926, vol. 4, pt. 1, pp. 13-21, 2 pls.; Anal. Acad. Nac. Cienc. Exactas (issued in:) Anal. Soc. Cient. Argentina, 1929, ser. 2, vol. 107, pp. 491-497, 4 figs.

A stone weighing 896 grams was found while ploughing in 1895 near the railway station Avia Terai in the Territory of the Chaco. A polished surface shows yellow and brown patches with pale-grey nodules and bright metallic specks. Sp. gr. 3.407. From analyses of the magnetic and non-magnetic portions the bulk composition is: SiO_2 38.860, TiO_2 trace, P_2O_5 0.327, Al_2O_3 11.947, Cr_2O_3 0.601, Fe_2O_3 0.102, FeO 19.765, NiO trace, CoO trace, MnO 0.620, MgO 20.051, CaO 2.700, Na_2O 0.572, K_2O 0.071, SnO_2 0.031, S 3.034, Fe 2.916, Ni 0.387, Co 0.085, P 0.015, chromite 0.045, corresponding with hypersthene 36.90, olivine, 26.24, feldspars 16.65, troilite 8.34, nickel-iron 2.98 %, &c. The stone is classed as 'franckfortose'. With the 1926 note is given a list of 16 Argentine meteorites and a bibliography.

L. J. S.

HERRERO DUCLOUX (Enrique). *Nota sobre el meteorito del Parque*. Rev. Fac. Quím. Farm. Univ. Nac. La Plata, 1926, vol. 4, pt. 1, pp. 5-11, 3 pls.; Anal. Acad. Nac. Cienc. Exactas (issued in:) Anal. Soc. Cient. Argentina, 1929, ser. 2, vol. 108, pp. 197-206, 5 figs.

A mass measuring $13 \times 9 \times 4$ cm. and weighing 1593 grams, said to have been found in 1811 in the Gran Chaco, was deposited in the Artillery Park of Buenos Aires and in 1869 was presented to the National Museum in Buenos Aires. Following the Buenos Aires Museum it is named 'Del Parque'. [In the British Museum Catalogue of Meteorites (1927) it is listed under 'Gran Chaco'.] It is a siderolite (pallasite) quite distinct from the 'Otumpa' irons from the same region. The specific gravity of the whole mass is 5.106; of the metallic portion (63.9 %) 7.70-7.77; and of the stony portion (36.1 %) 3.205-3.255. The etched metal shows a heterogeneous structure, but suggestive of a fine to medium octahedrite. Analysis of the metallic portion gave: Fe 93.418, Ni 5.615, Co 0.389, Mn 0.053, Cr trace, P 0.121, S 0.726, insol. trace = 100.322. The stony portion gave: SiO_2 41.050, TiO_2 trace, P_2O_5 0.201, Cr_2O_3 0.130, Al_2O_3 0.732, Fe_2O_3 trace, FeO 12.624, NiO 0.998, CoO 0.041, MnO 1.180, MgO 34.070, CaO 7.436, Na_2O 0.789, K_2O 0.283 = 99.534, corresponding with olivine 77.21 %, &c.

L. J. S.

HERRERO DUCLOUX (Enrique). *Tres nuevos meteoritos del Museo Nacional de Historia Natural de Buenos Aires*. Anal. Mus. Nac. Hist. Nat. Buenos Aires, 1929, vol. 34 (for 1926-28), pp. 587-601, 10 pls.

Reprints of three articles published elsewhere. El Mocoví [M.A. 4-120], with a note by M. Doello-Jurado, Director of the Museum, and an additional plate showing pictures of the entire mass of 732 kg. Del Parque [see preceding abstract]. Pampa del Infierno [preceding abstract], with an additional figure. L. J. S.

HERRERO DUCLOUX (Enrique). *Meteoritos Argentinos. Los metales nobles de "El Toba"*. Anal. Acad. Nac. Cienc. Exactas (issued in:) Anal. Soc. Cient. Argentina, 1929, ser. 2, vol. 107, pp. 153-176, 19 figs.

A revised list is given of 20 Argentine meteorites under the groups holosiderites, syssiderites, sporosiderites, and asiderites. A bibliography is added. Analyses of the 'El Toba' iron and of the weathered crust are quoted [M.A. 3-388]. Etched surfaces of this ataxite show in some places 'lines of cleavage' comparable with Neumann lines. 100 grams of the iron yielded Ir 0.031 gram and Ru 0.014 gram. Several photomicrographs are given of the crystals obtained in the micro-chemical reaction for these metals. Pt, Rh, Pd, Os are also present. L. J. S.

HERRERO DUCLOUX (Enrique) & PASTORE (Franco). *El meteorito de Isthilart (provincia de Entre Rios)*. Rev. Fac. Quím. Farm. Univ. Nac. La Plata, 1930, vol. 6, pt. 2, pp. 13-26, 5 pls.

A stone weighing 3050 grams was observed to fall with accompanying detonations at 7.30 a.m. on November 12, 1928, close to the railway station Isthilart, 30 km. north of Concordia, Argentina. It penetrated the soil to a depth of 40 cm. and broke into two pieces, which were still warm when taken out. Sp. gr. 3.510-3.519. The constituents are olivine (with optic axial angle near 90°), less enstatite, little clinoenstatite, traces of plagioclase, and much metal; and the structure is chondritic. Analyses of the magnetic and non-magnetic portions give the bulk composition: SiO_2 35.40, TiO_2 trace, Al_2O_3 3.37, Cr_2O_3 0.53, Fe_2O_3 trace, FeO 10.69, NiO 1.24, CoO trace, MnO 0.42, MgO 19.50, CaO 1.93, Na_2O 1.48, K_2O 1.48, P_2O_5 0.42, SO_3 0.04, S 2.37, Fe (as troilite) 3.40, Fe 17.53, Ni 1.71, Co 0.12, Mn 0.02, P 0.03, corresponding with olivine 37.22, hypersthene 17.61

diopside 3.12, feldspar 14.90, chromite 0.90, apatite 0.93, troilite 6.42, nickel-iron 18.80. This composition represents a new type, called 'isthilartose'.

L. J. S.

RICHARDS (H. C.). *The Glenormiston meteorite*. Mem. Queensland Museum, 1930, vol. 10, pp. 65-72, 6 pls.

A mass of iron weighing about 90 lb. (as received, after two pieces had been removed, 85½ lb.) was found in 1925 near Glenormiston (22° 54' S., 138° 43' E.), 90 miles west of Boulia, western Queensland. It is a concavo-convex pitted fragment measuring 19.5 × 13.2 inches with a thickness of 2-4 inches and perforated by one hole. A polished and etched surface shows an irregular aggregate of kamacite grains averaging 6 mm. (2½-13 mm.) across, with some taenite and plessite between the grains and minute nodules of troilite and schreibersite scattered throughout the mass. The kamacite shows a prominent sheen in different directions and well-marked Neumann lines, but no Widmanstätten figures. Analysis I by F. Connah. The iron is classed as a brecciated medium octahedrite.

	Fe.	Ni.	Co.	P.	S.	C.	Total.	Fe:Ni.	Sp.gr.
I.	89.74	8.71	0.21	0.36	0.30	0.24	99.56	10.3	7.621
II.	92.9	6.4	0.1	0.18	nil	nil	99.58	14.5	7.75
III.	59.4	2.0	0.3	—	33.4	2.3	97.4	—	—

Mention is also made of a mass of meteoric iron, measuring 33 × 12 × 9 inches and weighing 14½ cwt., that was found in 1914 near Gladstone, Port Curtis. Analysis II by F. Connah is of the metallic portion. Large nodules of troilite (anal. III) contain admixed graphite and particles of iron. An etched slice (figured) shows the structure to be that of a coarsest octahedrite with the lamellae of the Widmanstätten figures up to 4 mm. in width. A fall of stones (102 fragments) was observed in 1869 on Tenham station, near the junction of Cooper and Kyabra creeks in SW. Queensland. Other Queensland meteorites previously described are the Le Gould's and Warbreccan stones, and the Mungindi, Thunda, and South Queensland irons.

L. J. S.

NININGER (H. H.). *Notes on oxidation of certain meteorites. The formation of meteorodes*. Trans. Kansas Acad. Sci., 1929, vol. 32, pp. 63-67, 6 figs.

Reprint with a few additions of a previously published paper [M.A. 4-264].

L. J. S.

GOLDSCHMIDT (V. M.). *Über das Vorkommen des Germaniums im Meteoriten von Cranbourne*. Zeits. Physikal. Chem., Abt. A, 1930, vol. 146, pp. 404-405.

Chalcophil elements [M.A. 2-152] would be expected to be present in the sulphide phase (troilite) of meteorites; and as elements of even atomic number should theoretically be the more abundant, search was made for germanium. In the rust of the Cranbourne (Victoria, Australia) meteoric iron germanium to the order of 0.1 % was detected by precipitation as sulphide and by X-ray spectrum analysis. Other elements detected are Cu, Zn, Ga, As, Pb, Sn, Mo, Ru, Pt, Ir, Pd, Rh, Ag, Os, Au.

L. J. S.

PAPISH (Jacob) & HANFORD (Zaida M.). *Occurrence of germanium and arsenic in meteorites*. Science, New York, 1930, n. ser., vol. 71, pp. 269-270. [Cf. M.A. 4-191.]

Germanium was detected spectroscopically in two siderites, two siderolites, and two aerolites. The Toluca iron (26 grams dissolved in HCl and the distillate precipitated with H₂S) gave strong lines of germanium and also some for arsenic. The Welland iron gave less intense lines.

L. J. S.

BARRINGER (Daniel Moreau). [*Further notes on Meteor Crater in northern central Arizona* (No. 2). Proc. Acad. Nat. Sci. Philadelphia, 1925, vol. 76 (for 1924), pp. 275-278, 1 pl.

A drill-hole under the southern wall of the crater passed through about 30 feet of 'iron shale' cementing fragments of metamorphosed sandstone, and the drill stuck at a depth of 1376 feet. It is believed that this must represent the upper surface of a large mass of iron. It is further suggested that the 'iron shale' is the oxidized product of an outer layer of the 'shale-ball' type; and that in the known masses of the Canyon Diablo iron the removal of this material by oxidation (rather than by fusion) has given rise to the pits and cavities [cf. Min. Mag. 22-272]. In the 21 drill-holes made seventeen to eighteen years previously near the centre of the crater only small amounts of 'iron shale' were met with.

L. J. S.

BARRINGER (Daniel Moreau, Jr.). *A new meteor crater*. Proc. Acad. Nat. Sci. Philadelphia, 1929, vol. 80 (for 1928), pp. 307-311.

The place near Odessa, Ector Co., Texas, where a piece of meteoric iron was found in 1921 [M.A. 1-402] is marked by a shallow depression surrounded by a raised rim consisting of fragments of lime-

stone and sandstone. This is roughly circular with an average diameter of 530 feet. The rim is about 18 feet above the bottom of the hole, but only 2 or 3 feet above the surrounding desert plain where horizontally bedded limestone is exposed. The steep inner slope shows the limestone dipping at 20-30° from the centre. Numerous pieces of 'iron shale' and a few small pieces of metal were found on the surface of the rim. It is suggested that, like the Meteor Crater of Arizona, this depression was formed by the impact of a large meteorite, or perhaps (as oxidized fragments are abundant) a swarm of small masses.

L. J. S.

FAIRCHILD (Herman L.). *Meteor Crater exploration*. Science, New York, 1929, n. ser., vol. 69, pp. 485-487.

— *Nature and fate of the Meteor Crater bolide*. Ibid., 1930, vol. 72, pp. 463-467.

The first note gives a brief account of the discovery and exploration of the meteor crater in Arizona. In the second note the suggestion is made that the meteorite consisted of stony matter with large inclusions of metal, and that it was broken up by the impact [but meteorites of such a type are unknown].

L. J. S.

PANETH (F.), URRY (Wm. D.), & KOECK (W.). *The age of iron meteorites*. Nature, London, 1930, vol. 125, pp. 490-491.

— with URRY (Wm. D.) & KOECK (W.). *Zur Frage des Ursprungs der Meteorite*. Zeits. Elektrochem. u. angewandte physikal. Chem., 1930, vol. 36, 727-732, 2 figs.

Further determinations of the amount of the helium and radium in meteoric irons [M.A. 4-122]. Determinations on 25 meteorites show a maximum age of 2900 million years, i.e. less than the assumed age (3×10^9 years) of the solar system. Meteorites contain the same chemical elements as the sun, and they have a common origin with the planets. The oldest consolidated at about the same time as the earth.

L. J. S.

WHIPPLE (F. J. W.). *The great Siberian meteor and the waves, seismic and aerial, which it produced*. Quart. Journ. Roy. Meteorological Soc. London, 1930, vol. 56, pp. 287-304, 4 figs.

Microbarographs recorded air waves in the south of England between 5 and 6 a.m. on June 30, 1908. Travelling with the velocity of sound, this disturbance is timed with the Siberian meteor observed at 0 h. 15 m. (G.M.T.) on the Chambe river (61° N.,

101° 18' E.), a tributary of the Podkamennaya Tunguska (= Stony Tunguska) and about 100 km. NW. of Vanovara. Seismic disturbances were recorded at Irkutsk, Tashkent, Tiflis, and Jena (the last at 0 h. 46 m.). Mention is also made of the midnight glows and twilight seen in Europe on June 30, 1908. After a lapse of many years, search was made by L. Kulik in 1921 and 1927 for the place of fall, but no meteorite has been found. [M.A. 2-257, 3-92, 3-256, 4-261.]
L. J. S.

KEYES (Charles). *Planetesimal hypothesis and the theory of meteoritic agglomeration*. Pan-Amer. Geol., 1929, vol. 51, pp. 81-92.

It is asserted that the amount of meteoric material falling on the earth, especially as cosmic dust, has been underestimated. Meteoric masses have been found more abundantly in desert regions where they have escaped disintegration. Black sands consisting largely of metallic particles are found in deserts. The suggestion is made that this cosmic material plays an important part in the formation of ore-deposits.
L. J. S.

Miscellaneous.

FEIGL (F.). *Über einen neuen empfindlichen Nachweis von Sulfiden und Thiosulfaten*. Zeits. Anal. Chem., 1928, vol. 74, pp. 369-376, 4 figs.

FEIGL (F.) & LEITMEIER (H.). *Ein neuer Nachweis für Sulfidschwefel*. Min. Petr. Mitt. (Tschermak), 1929, vol. 40, pp. 20-44, 1 pl.

A mixed solution of sodium azide and iodine in potassium iodide gives a vigorous evolution of nitrogen when in contact with sulphide or sulpharsenide minerals ($2\text{NaN}_3 + \text{I}_2 = 2\text{NaI} + 3\text{N}_2$). A large number of minerals have been tried out by this method, the liquid being applied to the powder, a fragment or crystal-face, streak on a streak-plate, or on micro-sections.
L. J. S.

LEITMEIER (H.) & FEIGL (F.). *Der Nachweis von Magnesium in Mineralien*. Min. Petr. Mitt. (Tschermak), 1930, vol. 40, pp. 325-334.

A simple test for magnesium [cf. M.A. 4-141] is given by warming the powdered mineral in a solution of nitrobenzeneazoresorcinol containing an excess of sodium hydroxide. In the presence of even a small amount of magnesium the powder acquires a blue colour.

Silicates must be first decomposed; and if much iron is present this must be separated. L. J. S.

ALIMARIN (I. P.). *Über die qualitative Bestimmung geringer Mengen Fluor in Silicatmineralien und Gesteinen.* Zeits. Anal. Chem., 1930, vol. 81, pp. 8-14, 2 figs.

A useful semi-quantitative method of testing for small amounts of fluorine in rocks and minerals is described. The method is based on the bleaching of the purple colour of a zirconium alizarin lake by hydrofluoric acid, which is driven out of the mineral by fusion with boric oxide and collected in water. [Cf. M.A. 4-336.] M. H. H.

DITTLER (E.). *Zur Analyse chromhaltiger Silikate.* Min. Petr. Mitt. (Tschermak), 1929, vol. 40, pp. 189-190.

The silicate is fused with sodium peroxide in a silver crucible and the acidified solution of the melt is treated with hydrogen peroxide in order to reduce the chromate to chromic ions. After separation of the silica, the sesquioxides are precipitated twice with ammonia and the precipitate ignited in a current of hydrogen and again fused with sodium peroxide. The iron remains insoluble and the manganese is precipitated with hydrogen peroxide. Chromium is then estimated volumetrically, and the aluminium by difference.

L. J. S.

HUEBER (H.). *Bemerkungen über die Bestimmung des Titans und Eisens in Gesteinen.* Min. Petr. Mitt. (Tschermak), 1929, vol. 40, pp. 192-195.

The methods of W. F. Hillebrand and J. Jakob are criticized. In the new method the titanium is estimated colorimetrically with hydrogen peroxide in the sulphuric acid solution of the sesquioxides. The solution is then boiled until the orange-yellow colour disappears, and the iron is precipitated with ammonia; iron is then dissolved in dilute hydrochloric acid and estimated volumetrically.

L. J. S.

ORCEL (J.). *Remarques sur l'emploi du cupferron dans l'analyse des silicates et des aluminates naturels.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 66-72.

The separation of iron and aluminium in silicate analyses can be directly effected by the use of cupferron; the method is of particular value when magnesium is present. The author describes the tech-

nique in detail and illustrates its application to analyses of chlorites and spinels.

F. A. B.

WILKE-DÖRFURT (Ernst) & WOLFF (Ernst August). *Jodtrichlorid als Aufschlußmittel für sulfidische Mineralien, insbesondere für Pyrit.* Zeits. Anorg. Chem., 1930, vol. 185, pp. 333-336.

A 35% solution of iodine trichloride in concentrated hydrochloric acid was found very satisfactory, and preferable to other methods of attack for refractory sulphides, especially pyrite. After solution in a flask with a trap for any sulphur in the reaction gases, the solution was treated with hydroxylamine hydrochloride, the separated iodine recovered by filtration, and the iron re-oxidized by hydrogen peroxide. The reagent is prepared by passing chlorine over iodine cooled to -79°C .

M. H. H.

EDDY (C. E.) & LABY (T. H.). *Quantitative analysis by X-ray spectroscopy.* Proc. Roy. Soc. London, Ser. A, 1930, vol. 127, pp. 20-42, 1 pl., 1 text-fig. [Cf. M.A. 4-187.]

By comparing the intensities of X-ray lines emitted from an alloy of two elements of nearly equal atomic number, it is possible to obtain the constitution of the alloy. A survey of results obtained with many different binary alloys shows that the error involved in determining the amount of an element present is about 0.5 % when it forms 50 % of the alloy, and as little as 0.01 % error when 0.1 % is present. The presence of a third element does not affect the results. The agreement between the results of chemical analysis and X-ray measurements is evidence in favour of the photographic method of measuring intensities of X-ray beams. Moreover, the intensity ratio for two emission lines from an element is independent of the intensity of one line, a necessary condition for quantitative work. A preliminary account of a method for dealing with alloys of elements of unequal atomic number is also described.

F. A. B.

MARSH (Joseph K.). *The rare earths associated with uraninites.* Phil. Mag., 1929, ser. 7, vol. 7, pp. 1005-1011.

Pitchblende from various localities was tested for rare-earths, the largest amount found being 1% in material from Norway. Spark spectra and absorption spectra of solutions showed the presence of Sc, Eu, Yt, Yb, Dy, Ho, Er, Tm, &c. They are probably present in some admixed mineral, such as samarskite.

L. J. S.

BURT (Frederick A.). *Capsular silica*. Amer. Min., 1929, vol. 14, pp. 222-226, 4 figs.

The Tertiary and Quaternary formations of Brazos County, Texas, are rich in precipitated silica, in the form of quartz, chalcedony, or opal, which encrusts fossil wood, forms veins, or acts as a cementing material. On the surface of cubes of granular quartz (probably pseudomorphous after pyrite) are capsule-shaped bodies of chalcedony regularly arranged parallel to the cube-edges. L. J. S.

FRIEDLAENDER (C.). *Der Chloritoid vom Crestlianderstobel*. Schweiz. Min. Petr. Mitt., 1930, vol. 9, pp. 247-264, 1 fig.

The chloritoid-schist at this locality in the Somvix valley, Grisons, consists of a sericite-phyllite with many porphyroblasts of chloritoid. This chloritoid contains inclusions of quartz, &c.; but small quartz veins traversing the rock contain aggregates of chloritoid scales that are free from inclusions. The latter material has sp. gr. 3.358, α 1.724, β 1.726, γ 1.737, 2V 63°, $\gamma:c = 21^\circ$, and pleochroism α green-brown to grass-green, β deep blue to blue-green, γ yellow-green. Analysis I by J. Jakob gives the ratios $3\text{SiO}_2:3(\text{Al,Fe})_2\text{O}_3:2\text{RO}.2\text{H}_2\text{O}$. Another chloritoid from the Saas valley, Valais, has sp. gr. 3.371, α 1.715, 1.719, γ 1.737, 2V 50° 30', pleochroism α olive to blue-green, β blue, γ pale. Analysis II gives $\text{SiO}_2:\text{R}_2\text{O}_3:\text{RO}+\text{H}_2\text{O} = 4:4:7$. The ratios given by earlier analyses of chloritoids are tabulated; many approximate to $\text{SiO}_2:(\text{Al,Fe})_2\text{O}_3:\text{RO}:\text{H}_2\text{O} = 1:1:1:1$, but for ottrelite SiO_2 is 2 and for venasquite it is 3. Optical data are tabulated and also show considerable variation.

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	Na_2O .	K_2O .	$\text{H}_2\text{O}+$.	Total.
I.	26.62	37.65	11.91	13.70	0.04	2.67	1.21	0.46	5.59	100.06*
II.	25.30	41.24	2.39	18.02	0.09	3.60	2.53	0.76	6.15	100.08

* I, including TiO_2 0.21.

L. J. S.

PELLOUX (Alberto). *Caledonite e leadhillite della miniera di Tiny nella valle di Oriddo (Domusnovas) Sardegna*. Periodico Min. Roma, 1930, vol. 1, pp. 201-207, 1 fig.

These minerals, already known from several localities in Sardinia, are now recorded from the Tiny mine in the Oriddo valley, where they are associated with cerussite, linarite, malachite, chrysocolla, traversoite, massicot, and galena. The crystals of caledonite show the forms *c b m e r t s x*, [Dana's letters]; those of leadhillite *c L w u e a h r q \theta*, and have 2E 21°. L. J. S.